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Report

of the Commission
on Graduate Studies
in the Humanities
and Social Sciences



Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Report of the Commission on Graduate Studies
in the Humanities and Social Sciences

VOL. 1

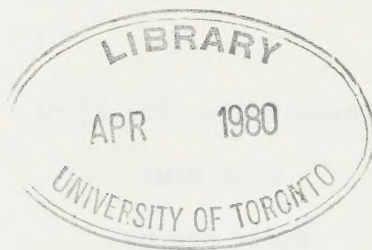
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INTRODUCTION

INTRODUCTION

In January 1974 the Canada Council set up a Commission of Inquiry into Graduate Studies in the Humanities and Social Sciences. The proposed mandate was very general and covered virtually every aspect of graduate studies in those two fields of teaching and research.¹

The Commission wished to carry out its mandate completely and, within the limits of its resources and its energy, it set about dealing with the numerous and complex aspects of its task.

Before beginning the inquiry, however, we were anxious to clarify the key terms of the mandate, the meaning of which might, at first glance, appear "loaded" and in some cases create controversy. Examples of this would be the "effectiveness" of graduate studies, "expectations" of studies at the graduate level, "relations" between teaching and research, graduates' "chances of finding employment," and the "contribution" of graduate studies in the humanities and social sciences to economic, cultural and political life in Canada.

From our deliberations, emerged hypotheses which have become the major themes of this report, helped shape our subject definition and inspired the procedures and study plan.

1. Reasons for the Commission

During the past ten years there have been a number of studies of universities and of university research. In the wake of the Macdonald, Bonneau-Corry, Hurtubise-Rowat and Lamontagne Reports and a number of provincial studies, we were frequently asked what justification there was for yet another investigation.² We were convinced that it was an appropriate time for the proposed study because we believed that crucial decisions would be made over the next few years which would determine the future of Canadian universities and of research in Canada, and that attention should be drawn to the special problems of the humanities and social sciences.

It did not require much imagination to realize that there would be major changes in the pattern of graduate training in Canada over the next few years. Canadian universities have experienced almost 20 years of dramatic expansion. The demand for qualified professors had been almost insatiable,

and graduate faculties were established or expanded to provide the necessary training. This almost frenetic growth was bringing demand and supply into balance when the equilibrium was again disrupted. In the early 1970s undergraduate enrolment levelled off and the demand for additional professors slumped. Many of the graduate students and even many of the graduate programs in which they were enrolled no longer seemed necessary. A new equilibrium between the demand for and the supply of graduate students was required. But how could the demand be assessed? Should the number of PhDs be determined solely by the number of openings on university faculties? What was the purpose of graduate training in the humanities and social sciences in Canada? A reassessment of the aims and objectives of this graduate training was clearly needed before any major revisions were undertaken.

It would have been a mistake, however, to limit our terms of reference to graduate training, because there was a growing awareness that the role of research was also undergoing significant changes. The Senate Special Committee on Science Policy had stressed the radical impact of research in modern societies. The Committee also predicted that scientific research in the future would combine research in the social sciences with research in the natural sciences and that there would therefore be more demand for trained social scientists. Any reassessment of graduate training in the human sciences in Canada would have to assess the future demands for research and consider how graduate enrolment and graduate programs could best respond to these demands.

But our study could not be confined to changes within faculties of graduate studies. Canadian universities depend on government funds, and any shifts in government policies directly affect graduate training. Federal and provincial governments had already criticized the steeply rising costs of higher education. It was obvious at the time of our appointment that there would be constraints on future university expenditures. Nobody could predict the form or severity of these constraints, but there was no doubt that they would have a significant impact on graduate training in the human sciences. We hoped that our study would contribute to the formation of these political decisions.

The decisions would depend in part on the level of government at which they were made. Here again Canada seemed to be in a period of transition. The

federal government had taken the initiative in the 1950s and had encouraged and supported the expansion of graduate training, but more recently its role had been challenged by provincial administrations. The entire structure of financial relations between the federal and provincial governments was being renegotiated, and the outcome of these negotiations would have a significant impact on the future of Canadian universities.

Another element of change was the proposed division of the Canada Council into an arts council and a council on research in the humanities and social sciences. For almost 20 years the Canada Council had played a major role in funding Canadian research in the human sciences and in developing supporting programs. The Council had also played a prominent role in the development of the arts in Canada, a field which is still rapidly expanding. For a number of reasons, the Senate Special Committee on Science Policy had recommended the division of the Council, and the government had already announced its intention to create a separate Social Sciences and Humanities Research Council.³ This Council would then be associated with the National Research Council and the Medical Research Council in a tripartite structure under the Ministry of State for Science and Technology. Scholars in the humanities and social sciences were naturally concerned about any major change in the Canada Council. They were apprehensive that the proposed new structure would make the new Council vulnerable to political interference. They knew that the National Research Council and the Medical Research Council had always reported directly to a minister, apparently without having to contend with political influences but the comparison was not completely reassuring because research topics in the humanities and social sciences are often more controversial and more likely to provoke political controversy.

Thus the Canada Council decision to commission a study on graduate training and research in the humanities and social sciences came at a critical juncture. The era of expanding university enrolments had ended, the social importance of research had gained wider recognition, governments were applying financial constraints, federal-provincial relations were being redefined, and a new Social Sciences and Humanities Research Council was about to be established. The aims and objectives of graduate training and of university research might well be distorted or disadvantaged if no attempt was

made to redefine them in the light of such rapidly evolving changes.

Our subsequent contacts with scholars, university administrators and public officials confirmed the need for this study. We have modified our assessment of the relative importance of the changes that are taking place, but we are more conscious than ever of the pressures for change and the need to adapt both graduate training and university research because of these changes. There may be no widespread agreement on what should be done, but every informed observer will agree on the need to reassess the aims and objectives of graduate training and university research in Canada.

2. Major Themes of the Report

The studies we carried out quickly confirmed the guidelines suggested to us by the questions we were asked and those which, at the outset, we were asking ourselves on the interpretation of our mandate.

a. Interaction of Science and Society

The Saint-Paul-de-Vence conference on science and society in June 1972 brought together about 40 scientists from nine countries. They confirmed that the relationship between science and society, while a close and a basic one,⁴ was ambiguous and gave rise to deep divergences of viewpoint as a result of the lack of a commonly accepted theoretical framework. Therefore, while recognizing that the exact nature of this relationship constitutes a problem, we shall give this question, because of its importance, a central place in our concerns.

It would be impossible to carry out an examination of the present and future of graduate studies in the humanities and social sciences if they were taken out of their total environment, which is that of the industrially developed society. The sciences - natural sciences and, increasingly, social sciences - are the driving force of this society. This changes the character of the demands that governments and private organizations now make on universities: the universities are creators and dispensers of knowledge and skills, and they train the specialists required. It is in meeting these demands in a positive way, but selectively and after careful thought, in accordance with its distinctive purpose, that the university will be able to persuade governments and the public to give it the material and human resources it needs in order to progress.

This state of affairs explains the growing presence of governments in university life - research councils, mission-oriented research done by government departments, the Secretary of State Department, the Ministry of State for Science and Technology, or their various counterparts in provincial governments. In teaching as well as in research, universities are no longer "free" institutions of learning in the sense that they are able to "go it alone." Governments provide the universities with the major part of their capital and operating funds and intervene more and more directly in developing courses of study and establishing conditions for the coordination of interuniversity activities.

For the same reasons, the most diverse groups in society feel increasingly concerned by the directions in which the university is going. They make numerous demands which the university should try to meet. The university, until recently an institution mainly concerned with training new generations of professionals and recruiting professors from its own ranks, will now have to devote itself as well to training specialists in new fields that have developed in the last 30 years and preparing scholars to solve the many problems which have arisen in recent times. Pressed as they are on all sides by requests from groups in society which are often antagonistic to one another, the university and academics must think of new ways to train the specialists needed by society.

b. Graduate Studies and Formulation of Social Objectives

Today as in the past, universities are expected to fulfil a "critical" function. In theory if not always in practice, the university is given the right to pass judgment on the social objectives of individuals, communities and governments, and on the means of achieving these objectives. The university would find it impossible to fulfil this critical function suitably if graduate studies, and most particularly research, were not fully utilized.

It is to be expected that the humanities and social sciences will assume a special responsibility in this regard because, for various reasons, the world of "values" is an integral part of their purpose. What is the current situation?

For a number of reasons which will be examined, the natural sciences model has been imposed on the social sciences and on several disciplines in the

humanities. The favor enjoyed by the methods and directions which have proved advantageous to the natural sciences is not in itself reprehensible. Scholars in the social sciences have saved themselves much unnecessary labor by adopting working methods that have already proven their worth elsewhere. However, attempting to restrict the field of research in the social sciences, as is often done, to subjects that lend themselves to quantitative methods is a parody of the intellectual approach particular to the natural sciences. This narrow conception also prevents the social sciences from questioning the values underlying their own approach and most social aims.

The "objectivity" and "neutrality" claimed by the social sciences often justifies a refusal to judge the ends being pursued by "sponsors" of research projects suggested to scholars. Science in many ways serves the objectives of politics and industry. We cannot agree that the social sciences can be considered as neutral, or value free. This neutrality is being questioned increasingly in the natural sciences, where it has long been prevalent. In the natural sciences, the ethical aspect of the actual purpose of research has rarely been put forward directly, although it often has been in the social sciences.⁵ This question is so important in our view that we consider the participation of the social science scholar in defining research objectives as an integral part of the research itself.

This conception of science and social science research will not be acceptable to all. However, we are convinced of the correctness of our position to the extent that we have made it one of the major themes of this report.

c. Needs and Wishes of Professors and Students

Most university professors in Canada devote only part of their energies to graduate studies. Moreover, while professors' workloads include teaching at the master's and doctoral levels, the same is not true of research, still too often considered in the human sciences as a marginal activity, taken for granted. In the chapter on professors, we will deal with the necessary conditions for arriving at a much wider view of the university professor as an instigator and promoter of graduate studies in the human sciences.

Graduate students vary in number from one university to another. They have a quite highly developed sense of their own identity and more or less well-established associations of their own. However, in Canada, generally

until now, they have not exerted pressures on the university as undergraduate students have done, and their needs and wishes are not nearly as well known, and no doubt not as fully acknowledged by the institution. We shall concentrate on the status that these students hope to achieve in the university and, as far as possible, describe their needs and wishes. As far as students are concerned, we shall adopt the view of the university described by Jean Ladrière:

The university should no longer be viewed as an environment in which individuals are introduced to an established discipline, but as an environment in which they find the material and human resources they need to acquire by themselves the training which corresponds to their tastes, their aspirations, their abilities and also the image they have come to form of society and their role in it.⁶ [Translation]

Each of the three lines of force selected as major themes of this report will have a definite impact on the near future of the university, which will in all likelihood be subject to strong pressures. To consider the university a closed system would be a serious mistake. According to Philip E. Mosely:

Under the impact of the industrial age, the nature and the extent of the involvement of university scholars and thereby, inescapably, of universities as major centres of liberal education, of professional training and of research, in the investigation of problems, both national and international, have changed greatly with each new generation. And each generation must, inevitably, reexamine and redefine the nature and the limits of that involvement, particularly with respect to those issues that in the end are subject to being decided, or at least shaped, by public authorities, by public funds and ultimately by public opinion.⁷

The university of 1985 will probably differ from the university of 1977 more than the university of 1977 differs from the university of 1960. The leap, however, will be more qualitative than quantitative. The major agent of change will no longer be the increase in student population, as was the case from 1960 to 1975, but rather the pressure of requirements at the graduate level. It is at that level that the finest fruits of the large investment in universities over the past 15 years have now begun to ripen. The period of getting under way, which lasted longer in the humanities and social sciences than in the natural sciences, may now be considered to have ended. It would be disastrous to think that graduate studies in Canada are already at the consolidation stage or the saturation point, since they have just reached the "cruising speed" necessary to ensure expansion. However, the present political and economic climate does not favor the growth

of graduate studies, which thus are likely to be stalled just as they enter a period of full expansion.

The process of qualitative maturing now taking place will be much less spectacular than the quantitative growth of the last 15 years; it is thus likely to go unseen or be scarcely noticed and to be inadequately understood or supported by governments and the public.

The university will not succeed without difficulty in justifying these new needs and, consequently, in meeting them. It has now become a public institution but has not yet realized the full extent and implications of the change. It will henceforth have to prove that it can produce the scientific knowledge and train the scholars and professionals which society so urgently needs. Much more than before, professors and students will have to understand that society supports the university not because science is in search of "truth", but because it is a source of knowledge that is judged useful. In order to fulfil its task today, the university will have to take care not to submit blindly to the demands of governments and the public. In reality, it is up to the university to define its objectives and to find valid ways of adjusting to its new environment. It is up to the university to help find a formula for interaction between governments, the public and itself which will result in a creative dialectic between partners.

3. Subject Definition: Science as a Driving Force in Contemporary Society

The preceding considerations highlight the terms of our mandate and suggest promising lines of investigation. They are of such importance in our view that it would be useful to review them systematically to make them the basis of our subject definition.

The leap forward which the university is being called upon to make can be stated as follows: how is an institution so thoroughly traditional to adapt to a new social environment which it had a large hand in creating? Theodore Hesburgh has written on this subject:

The university is among the most traditional of all the institutions of our society and, at the same time, it is the institution most responsible for the changes that make our society the most changing in the history of man. Perhaps the most central challenge facing universities in a changing world is: Can universities adapt themselves rapidly enough to survive amid all the changes they have stimulated?⁸

The often-heard charge that the university is an "ivory tower" is not a recent one - it was already being made in the nineteenth century. The term "ivory tower" connotes two sorts of reality closely related; it can be given two interpretations: a) the university as an institution is poorly linked to the social structure and thus represents a world apart, distant, inaccessible and insensitive to the many impulses which move and sometimes shake societies; b) professors, as teachers and scholars, operate in a closed system and look on the problems of mankind from a sort of airy Olympian height; and if they deign to descend among the people from time to time, to instruct or to offer solutions, it is in a somewhat autocratic manner, rather than as citizens directly involved in the life of the community.

The university as an institution has a long history; Oxford and the Sorbonne can point to 700 years of continuous existence. European immigrants brought old-world traditions to North America, including the university tradition. These same immigrants came with aspirations for a new and better world, and old institutions were subtly altered by the Atlantic crossing. The universities of the new world would transmit the heritage of the past, but they would also respond to the ambitions of people for social status and economic success.

The modern university bears little resemblance to these beginnings. In the mid-nineteenth century the president of a United States college could express the aims of a university in terms which also applied to Canadian universities of that period: "reverence for the aged, veneration for parents, for sacred institutions, for wisdom and for goodness in character."⁹ Nobody would dream of describing the aims of contemporary Canadian universities in these words. A president of a modern university might not disapprove of respect for tradition or for wisdom and good character, but he would not see them as the primary objectives of his institution.

The objectives of the modern university show how radically this institution has been transformed over the last century. They also show how diverse and complex the modern university has become. There is still concern with preserving the intellectual and cultural heritage of the past and transmitting it to future generations. But the libraries and

laboratories are seen as much more than the repositories of existing knowledge; for many the major role of the modern university is to add to the sum of human knowledge.

The first outlines of the modern university took shape in the sixteenth century, under the impetus of English merchants who wished to advance their own interests by using the knowledge produced by the pious monks for the glory of God, knowledge which they jealously kept to themselves. David Martin writes on the subject:

The monks were careful scholars, and in accordance with an ancient vow of intellectual chastity, bent all their energy to make their studies pure. In the study of numbers, for example, they achieved extraordinary heights of purity. Anything which was "applied" smacked of the Great City and contravened the ancient vow. All the same, many were still not content with the standards of purity and entered more ascetic orders devoted to pursuits which were not only useless but which could obviously be recognized as such.

Meanwhile, in the Great City there was a great need for knowledge and many people prepared and ready to seek it. The technocrats believed that knowledge was to be sought after in monasteries and asked the good monks to build new foundations, to allow into their midst many youths who had spent all their lives in the Great City. These had maybe never seen the long black robe of a monk, much less witnessed a performance of the ancient rites. Nevertheless, such youths prepared themselves by continuous spiritual exercises rising gradually from levels to degrees, happy in the promise that when they had spent their time with the monks they would become great men in the City. As for the monks, they were full of sad foreboding, but they began to raise the new foundations, just as the technocrats had commanded them.

So the young men and women from the Great City sat at the feet of the monks and learnt many things, but most of all they learnt how to live in a monastery. Many indeed so loved the cloistered calm of their mentors that they wished never to leave it. Others stayed awhile and on their return to the Great City set up brotherhoods to cultivate themselves, just as did the good old monks. Yet others returned to the world only to find that the technocrats had deceived them and that they were not to be great men in the City but minor officials in distant provinces. And the more it became noised abroad that the technocrats were deceivers in this important matter, the more youths there were who wished never to leave the life of the cloister. So the monasteries became full to overflowing, the ancient rites were disrupted and in many places ceased almost to be practised. The monks were blamed for serving the technocrats who had so deceived them; the technocrats were blamed for disturbing the hallowed ways of the ancient rule.

So it was that when the technocrats heard of all these things they began to build new houses, no longer in secluded valleys but in the Great City itself. In these houses appeared orders of friars (social scientists) whose business it was to think on the ways of the Great City and on the

ancient knowledge of the monks, so that both should be brought together in harmony.... Many were the things the friars preached about in the Great City, but the technocrats did not fear them. So the time came when the youths who sat listening in the great preaching houses said to the friars: no one here has taken the ancient vows and it is now time to turn knowledge into activity.¹⁰

The connection of the university to the larger social structure has never been, is not and probably never will be definitively made. By very reason of its secular functions - progress and dissemination of knowledge, and the study and systematization of a society's values at a given point - it would appear desirable that the university maintain a certain distance between itself and the larger society. This would be not for the purpose of avoiding its special responsibilities but rather that it may, with the detachment afforded by its status in society, be better able to enlighten citizens on their own position and the choices open to them.

The major task which has fallen to the modern university has been to attempt to reconcile the requirements of its twofold purpose: on the one hand, to devote itself to the pursuit of theoretical knowledge, and on the other hand, to meet the expectations of groups in society. Many of these groups count on the university to assist them in articulating and in solving problems which, because of their complexity or newness, go beyond the bounds of an imagination limited by special interests and empiricism.

While the question of the university's responsibilities toward society has always been asked, it is not surprising to note that the same is true of society's obligations to the university. The latter makes numerous demands on society, mainly of a material nature; in addition, the various groups in society, instead of seeking to subjugate the university to special interests, are expected to understand that the university must not waver from the strict guidelines that society has given it. Whenever the university has evaded the duties assigned to it, whoever the beneficiaries have been, the result has been ambiguous relations between it and the groups in society concerned, with the outcome being more often than not unfortunate results, rather than a creative dialectic between the parties.

This ambiguity, as it affects relations between the university and governments, is particularly harmful, especially when one considers the extraordinary growth of expectations of the university on the part of all

groups in society and the increasing hesitation of the university as to the manner of responding to these expectations. Since 1940 there have been not only quantitative changes but also a true qualitative leap. No longer is there simple, though rapid, growth within a familiar order of things; rather, there are widespread changes, the characteristics of which, not to mention the possible effects on minds and organizations, are difficult to determine.

In order to understand what we are witnessing, we must seek out the causes of the qualitative leap by the university in the upheavals which have shaken the very structure of society. The directions taken by scientific development since 1940, and the new industrial and social technology which has resulted, represent the major factor in this qualitative change.

In a large number of contemporary societies, the university and the research institutes which gravitate around it are among the major producers of scientific knowledge; thus there is no cause for surprise in the sudden renewal of interest on the part of governments and widely diverse groups in society in the university and in seeking new forms of relationships between the university and society.

Examining the same order of problems, Douglas T. Kenny, President of the University of British Columbia, probably produced the fairest answer that could honestly be offered - an answer that clearly reveals the very special and, it must be said, uncertain position of the university in society:

But there is only one kind of contribution we are equipped by our nature to make in return for society's support. That contribution is the fruits of the learning process in which we are engaged. Those fruits, regrettably, are not always tangible or quick-ripening ones. In fact, most are hard to see and slow to mature. Our returns to society are of greater value just for this reason, for they are more lasting returns. They are to be found in the intellectual maturing of students, in the long and patient searches of scholars, both of which lead - in the long run - to the enrichment of society as a whole.¹¹

The place of the university in society is uncertain in the sense that those responsible for policy decision-making, as well as the larger public, tend to remain insensitive to the services the university is able to render, if these are not accompanied by a promise of tangible short-term returns to

individuals and organizations. In a period of stricter limits on funding, governments will choose to reduce financial assistance to universities, and to education in general, before they restrain their spending in many other areas. They may choose to act in this way, since individuals and groups do not immediately comprehend the repercussions of these spending restraints, and thus are not prompted to make vigorous representations to their politicians to have them rectify their priorities in favor of the university. In addition, academic lobbies are notoriously powerless.

The university has become a centre of research and analysis, of scientific discovery, a place where we can expand our understanding of the physical and social worlds and of human nature. In North America, the university also fulfils other functions. It provides specialized training and certification for an ever-increasing number of professions, until the enrolment in professional faculties may rival or even surpass the enrolment in the disciplines in the arts and sciences. Universities also serve broader social objectives than they once did. The emphasis on the development of good character, so central to the nineteenth century university, was the emphasis of an institution, often identified with a religious denomination, which trained the youth of a small and closed minority. In contrast, the modern secular university, largely financed by public funds, is in principle opposed to discrimination by social class or creed, and indeed, an emphasis on equality of opportunity makes it an instrument of social mobility. The university is also seen as a reservoir of specialists and experts to whom government and industry may turn for information and advice. The small institution with narrowly defined objectives has become large and complex, with such diversity of aims and objectives that, according to Clarke Kerr, even its name is no longer appropriate and what we now call universities would be better described as "multiversities".

This modern institution has evolved gradually, without conforming to prior rule or principle. No single individual or institution provided the leadership, and no single social need or objective determined the pattern of change. It is clear, however, that the modern university first emerged in the United States in the years before the first World War and that it was a response to a variety of social pressures and social values. Democracy was one social objective, an objective which at that time was seen in terms of

individual freedom and opportunity. Critics of the university denounced its exclusiveness and advocated equality of opportunity. Linked with this was the need to broaden the curriculum, to dilute the elitism of the classical program by offering courses which would be attractive and useful to a wider student body. Democracy meant expanded enrolment, it meant a greater responsiveness to public expectations, it meant a greater concern for the "real" and the practical, for knowledge that had social "utility." The results within the university can be illustrated by the dramatic expansion of the university curriculum, with the rigidly structured classical curriculum being liberalized by the introduction of electives and options. Faculties of applied science, such as agriculture and engineering, might even rival the older faculties.

The university was also altered because of the enhanced social importance given to research. Research, like democracy, could have a variety of meanings, and research would be used to justify almost any scientific investigation, pure or applied. The spirit of inquiry, at first associated with German universities, found a hospitable climate in United States universities of the late nineteenth century. Graduate faculties were established, the PhD became the mark of a scholar, and research became a major activity at universities and one which seemed to many to be more creative than the traditional role of teaching. Early in the twentieth century, Thorstein Veblen could define a university as "a body of mature scholars and scientists, the 'faculty' - with whatever plant and equipment may incidentally serve as appliances for their work;"¹² that definition marks an extraordinary evolution in an institution which only a half-century before had usually been defined in terms of students.

The diverse pressures on the traditional university were not always consistent. Offering equality of opportunity meant allowing more students to enrol at the undergraduate level, but the emphasis on high standards of scholarship would limit the number of students eligible for admission to the graduate faculty. On the other hand, a research orientation required specialization in one discipline or area, and this was facilitated even at the undergraduate level by the number of options and electives. It should also be noted that while utility and research became dominant values in the new university, there were also other values which had their champions. The

advocates of a liberal culture, for example, were usually a small minority, but their claims for the humanist tradition and good taste were never completely ignored. The new university was a complex and diversified institution, extraordinarily flexible and adaptable. By responding to a wide range of social demands it became one of the major institutions in modern society, but at the same time it ran the risk of dispersing its efforts, of failing to identify its priorities and failing to distinguish between what was essential and what was secondary. For half a century, the new university was dynamic and successful, growing in prestige and influence and associated with most of the major developments of the period.

The preceding remarks raise various questions whose clarification is important. The conclusions we draw from them will enable us later in the report, we hope, to place in the proper perspective many of the questions raised. We are not attempting to present herein an original work; we are examining for our own benefit the contentious aspects of relations between science and society which have arisen in recent years, and we are briefly reporting on the effects of these new conditions on the university as an institution.

a. Science and Society

Whatever interpenetration of science and society exists today, the nature of the scientific method has not been essentially modified. As in the past, science represents "the body of knowledge and results which, in order to be based on methods of experiment and verification, are subjected to a universal theoretical recognition."¹³ At the same time, science reflects the "whole of the institutions and mechanisms for producing, disseminating and applying knowledge" or, in the words of Norman W. Storer, "the organized social activity of men and women who are concerned with extending man's body of empirical knowledge through the use of (investigatory) techniques."¹⁴

Science is not a univocal reality. As Louis Althusser points out, there is no such thing as "science" per se, but rather a number of "sciences."¹⁵ Furthermore, these sciences are graded on a scale, with different grading systems being possible according to the criteria selected. Thus the social sciences may be said to be "inferior" to the natural sciences with regard to criteria for experimentation and verification, but "superior" to the natural sciences in quality of purpose.

By nature and by vocation science is universal. Reference is commonly made to the "international science community" or to "world scientific culture." By contrast, the institutional framework of research which allows scientific progress to be made is generally national; in addition, in federally-governed nations there is often a sharing of powers between the different levels of government, as is the case in Canada. This twofold condition results in creative or, on the other hand, inhibiting tensions: different national "styles" of carrying on scientific activity, distinct ideological "colorations," and so on.

Science is only one of the many possible forms of knowledge, and can make no claim to absolute supremacy over other forms such as the arts, letters or philosophy. These other forms allow for ways of penetrating the secrets of nature and life which are much more firmly rooted in time, and from their respective viewpoints just as valid. Far from being natural to man, science as a systematic activity, as the sociologist Max Weber clearly demonstrated, is rather the product of specific historical cultures. It is difficult to imagine these cultures rejecting science, having absorbed it to the extent that today it is part of their very nature; however, this is not out of the question.¹⁶

As a particular cultural activity, science projects its own values onto society's values, leaving a deep and lasting impression. Of course, it is not to science but to human intellect that we owe the concern for "rationality," "objectivity," verification" and "experimentation." Nevertheless, with the gradual predominance of the scientific mode of knowledge from the sixteenth century on, this concern has increasingly taken on logical and ethical proportions. It is expressed today in a set of meanings and logical premises - abstraction, generalization and rationalization - which have become basic characteristics of contemporary bureaucratic mentality and organizations.¹⁷ This permeation of society by science is especially evident in results over the last four centuries. Even in the seventeenth century, Descartes stated that, thanks to experimental science, man was about to become "master and teacher of nature." Francis Bacon (who said that "science is power") expressed the same idea with an even greater awareness of the true calling of science.¹⁸

At this point one thing should be made clear: it is not science alone that is in question when speaking of the revolutionary social changes of the last four centuries, but perhaps even more the applications of science, which is to say, technology. Science is closely linked with different kinds of power - political, economic, social and cultural - in the sense that it is perhaps the mainstay of those powers because it was the driving force behind the three technological revolutions of the last two centuries: steam, electricity and the atom. Norman W. Storer put it very clearly:

Modern science is of little or no importance to the vast majority of the world's population, including the population of advanced, industrialized nations ... the existence of science and its work in advancing knowledge has almost no direct effect upon the man in the street anywhere in the world. Rather it is the application of scientific knowledge in engineering and other forms of technology that have brought such spectacular changes in the material context of our lives over the past century, and it has been the "popularizers" rather than scientists themselves who have facilitated the impact of scientific findings upon our basic values and our view of the world. It is only because of the increasing dependence of technology on scientific progress and the closer ties between science and the common universe of discourse, that we now speak of the "practical" importance of science ... Actually it has only been within the last century, if as long as that, that scientific progress and technology have been related at all ... But it has been increasingly the case that scientific advances are directly responsible for technological advances, so there is, actually, increasing justification for saying that science is important in our daily lives - even though the connection is still indirect.¹⁹

We will return later in the report to this central question of the link between science and technology. In any case, these links are much closer and more immediate than many people think. We accept the questions put in a Unesco report:

Are the borders between science and technology clearly defined? There are social motivations for industrialization and technology, but is there not also scientific voluntarism on the part of the scientist? Is there a break or a development between the natural world and the world remoulded by man? Is the scientific world a strict substitute for the external world, to a point where it would no longer be necessary to distinguish between scientific reality and concrete reality? The purpose of the dialectic between man and nature, according to Marx, was to humanize nature; but it is one thing to interpret usefulness to man in nature, and another to transpose nature to the level of man's institutions. Is this transposition not indicative of a cultural activity, an ideology for example - in any case a mental context distinct from scientific activity? There is some distance to cover between science and technology: by purely scientific instigation, or by an appeal from man? There is also a feedback effect of technology on the progress of science. But since technology develops according to man's needs, is it not then because culture intervenes increasingly in scientific activity?²⁰

[Translation]

The problem faced by the sociology of science does not primarily involve the reasons which led the modern Western world to cultivate the scientific method of reasoning - this was known for thousands of years. Neither does it bear on the use of scientific knowledge for practical purposes - this goes back very far, as evidenced by such amazing feats as building the great pyramids of Egypt. The problem essentially involves the importance given by Western man to this method of reasoning and, perhaps even more, to the motives which led him systematically to apply scientific knowledge to utilitarian purposes. No doubt the very nature of Western scientific accomplishment, from Leonardo da Vinci to Kepler, Copernicus, Galileo and Newton, principally in astronomy, physics and experimental mechanics, lent themselves more directly to applications than did the mathematics, geometry and the various cosmogonies of the scientists of the ancient world, notably Pythagoras, Euclid and Ptolemy. Nevertheless, it took a veritable cultural revolution for the Western world to set aside, over a few generations, the prescriptive wisdom of empiricism. In other words, the West replaced the ancient wisdom which dictated man's conduct with the search for experimental-type solutions.

The symbiosis of science and culture in all cases contains an element of dramatization. An illustration of this is to be found in the previously quoted Unesco study.

But this historic dramatization of confrontations between culture and science does not prevent us from coming back to a more basic level, to study the ability of cultures to assimilate scientific development without losing their distinctiveness. And perhaps this ability must be situated at several levels of depth ... is the dialectic between man and nature similar in all cultures? What is it that characterizes African or Asian cultures, for example, in comparison with Western cultures? Is nature understood in the same way, and does it lead to the same integration of man into his surroundings, to the same humanization, through work, of useful creations or works of art? A sociological analysis carried out in rural areas of Africa, South America, and India would be a rich source of information: housing, ventilation and farming are marked by such ingeniousness that it is difficult not to see in them the primary resources of science.²¹

This cultural revolution is concomitant with the new thinking which appeared after the breakdown of the sociopolitical framework of feudalism, which was manifested mainly in the Renaissance, the Reformation and the emergence of the bourgeoisie. Max Weber attempted to establish that the Protestant Reformation, capitalism and experimental science arose out of the

same spirit of systematic investigation and rationalism.²² In addition, and this has been clearly shown by Robert K. Merton,²³ the development of modern science was not only the fruit of abstract logic. The conception that Westerners formed of their social needs at different periods in history necessarily enters the picture. Beginning with the seventeenth century, choices made by societies, especially with respect to navigation and armaments, governed the general directions taken by scientific research. No doubt the social objectives proposed to, or imposed on scientists by governments and other agencies in society varied in time and space. But to the extent that consensus in a society became stronger with regard to needs to be met, and the conviction that science could provide valid solutions gained ground, the demands on science and scientists became stronger.

The interaction of science and society's needs, today very close, is also most complex. Science is truly the cement that holds modern industrial society together. Certainly there are still many proponents of the "scientific republic," demanding that science be strictly independent, in accordance with its own system of logic and sheltered from any exogenous influence. In addition, scientists should be free to choose their topics of research and basic approaches for the pursuit of theories and methods. It would no longer enter anyone's mind to adopt the famous toast made by the English mathematician, G.H. Hardy, in 1940, "Here's to pure mathematics. May it never have any use!"²⁴ Whether scientists are aware of it or not, today more than ever the problems they raise are in a dialectical relationship with society's needs.²⁵

Scientists can no longer remain "neutral" toward society, much less stand aloof from the emotional, and often contradictory needs of individuals and communities. In reality, as Jean-Jacques Salomon writes, the scientific community wishes science to constitute not only one of its ends but a valid means of bringing its purposes into line with those of society.²⁶

The dialectic between science and social needs leads scientists to come to terms, in practice, with the objectives of governments, military chiefs of staff, directors of economic enterprises, union leaders, and other leaders called upon to articulate social needs. In this way, modern industrial society has favoured economic growth and armaments. "A daughter of war," as Salomon refers to it, science could, with equal propriety, be called a daughter of industrial enterprise. The resulting choices have left a strong

impression on all contemporary political, industrial, social and cultural technologies. At the same time, these choices have favored progress in certain scientific disciplines, physics and chemistry for example, to the detriment of other disciplines such as microbiology and health sciences, psychology and sociology.

In the last few years, advanced industrial societies have come to question the social choices that have been made since the 19th century. The decision to bring scientific efforts to bear mainly on the objectives of economic growth and arms production has given rise to contradictory results. Along with the considerable improvement in the material conditions of existence (the standard of living), the quality of life has deteriorated to the disturbing extent that the very survival of mankind and of the planet is today in jeopardy. We might mention the agonizing problems associated with pollution in all its forms; the rapid depletion of nonrenewable natural resources and the extreme precariousness of food sources while the world's population grows exponentially and consumer expectations become ever more difficult to satisfy; the development of technology based on electronics and cybernetics, which is upsetting our preconceived notions of work, shattering the structures of manufacturing industries, and giving rise to new categories in society (technical intelligentsia, managers and technocrats); the universality and standardization of education; the apparently limitless expansion of free time, without the accompanying creation of the valid components of an "educated" culture of "leisure civilization"; the apparent inability of existing political systems to meet the demands of individuals and communities, which holds the growing threat for nation states of upheavals likely to shake the very foundations of human society.

Awareness of these distressing conditions has been spreading very quickly in the last 10 years, and an ever-increasing number of groups in society have begun to question the objectives which society has pursued since the 19th century. This questioning, directed specifically to the military-industrial technologies responsible for the hazards threatening our planet, pillories the capitalist system of production which favors military-industrial technology and the bourgeois class which exploits this technology for its own benefit. In a roundabout way it also attacks science itself, which is the source of this technology. It specifically accuses the

scientific community of consciously or otherwise putting itself at the service of the "Establishment". It even goes so far as to attack the basic foundations of modern science, that is, the pursuit of a "value-destroying" rationality and the approval of a method of validation which "kills life." Contemporary science, driven by blind logic and continuing to grow on the thrust given it in the 16th century, would inevitably lead the world to ruin.

We shall come back to the subject of the relationships between the contemporary cultural crisis and scientific activity. Let it be said immediately, however, that this crisis poses a question for science which it cannot evade. Moreover, the scientific community must contribute its share by giving thought to the question and finding answers.

It would seem that the broad outlines of a reply by politicians and other leaders of society, if not by the scientific community, to the questions raised by a scientific technology too heavily directed toward economic growth and armaments, are beginning to take shape. This reply may be summed up by the term "quality of life." It is through in-depth study of the meaning and the scope of this term that corrective action will be found to the choices made by society and the technology used by society until now.

Such an in-depth study should result in a conspicuous role being given to the social sciences and the humanities in putting new technology of a social and cultural nature into operation, to create an order of values more in line with the needs of our times. However, in their present state of development, the humanities and social sciences will have difficulty in meeting the increasingly specific expectations they arouse. They should strengthen their theoretical foundations, review their methodologies and avoid compromises with the powers that be. This is no mean responsibility. Even the best brains find it hard to conceive of the form the needed rectification might take. However, specialists in the human sciences can no longer refuse to fully assume all of their obligations.

b. The Growing Permeation of Society by Science: Consequences for the University

In resituating the university as a system sui generis in relations to itself and to the total environment, it becomes possible to assess the scope of the

task facing it in every one of its areas and its activities; graduate studies in the humanities and social sciences are primarily involved, since in many respects these are more immediately affected by recent developments than are other areas of teaching and research.

Governments and many groups in society would like the university to assume a number of duties, in particular the task of training new categories of specialists in disciplines corresponding more closely to conditions in a society subject to abrupt changes brought about by new technology: ecologists, demographers, development specialists, public relations and advertising specialists, computer programmers, specialist engineers in management, economics, political science, sociology, health sciences, gerontology, microbiology, and so on. As Robert E. McGarrah has stated:

Ironically, the university's role and mission are being challenged at a time when its capabilities and society's demands for more rational humanitarian approaches to problems of industrial civilization are perhaps greater than ever.²⁷

The university is being asked to respond rapidly to the many demands of people working in professional fields, for whom the changes taking place require retraining in one or more of these new disciplines.

On quite a different level - that of graduate studies - the university is expected to train the scholars society needs, either to direct and emphasize the new trends, or to diminish the undesirable consequences of the predominant technology. Moreover, academics are being asked to play a part in the creation of social policies and to undertake research in areas corresponding to society's priorities, in the assumption that this research will result in new industrial and social technology. At the same time, it is still mainly scientific academics who are being asked for the answers to the burning questions of the moment, questions concerning values and the very fate of the planet, in a world which has been so heavily influenced by scientific trends which today are being called into question. The modern university, far from being mired in inertia, is engaged in a dynamic process of interaction with its surroundings, and is changing constantly. The presence of elements of inertia within the university cannot be denied - they are all too obvious. However, the forces of change are in constant opposition and are sufficient to shatter them. Philip E. Mosely writes:

Under the impact of the industrial age, the nature and the extent of the involvement of liberal education, of professional training and of research, in the investigation of problems, both national and international, have changed greatly with each new generation.²⁸

The contemporary university is on the horns of a serious dilemma: either it cannot adjust to the conditions resulting from new forms of interaction between science and society, in which case graduate studies will vegetate and scientific research will in the end leave the university for more fertile ground; or it will respond successfully to the formidable challenges being made to it and, as was the case in the sixteenth century for the monasteries, when the monks acquiesced to the demands of the city merchants, it will emerge radically altered.

In the opinion of the Commission, the university cannot evade the urgent demands being made upon it without becoming unworthy of society's support but, at the same time, it must react selectively and in accordance with its own goals. Major readjustments are required in administration and in courses of study, student status, professors' workload, amount of resources needed and conditions under which they are utilized, the status of university research, relationships between free research and mission-oriented research and the connection of each of these with graduate studies.

The magnitude of the costs of university funding and the increasing awareness of the university's unique position in society will lead governments, many groups in society (citizens' groups in particular) and the general public to control very closely the way in which the university uses its resources and carries out the duties it is expected to assume.²⁹

A major aspect of the present circumstances in a federation such as Canada concerns the nature of the university's political framework in all its aspects and with particular regard to graduate studies and research. The federal government is relaxing its hold on the universities, which are gradually and irreversibly being incorporated into provincial systems of postsecondary education. Coordination of graduate academic studies is taking place increasingly in a provincial context. This development toward a growing "provincialization" of graduate studies and of the university in general we take to be a fact to bear constantly in mind in making our recommendations.

Our mandate limits our study to graduate studies in the humanities and social sciences. However, the entire university is today being challenged.

We are not unaware that universities are far from having found valid solutions to all the problems raised by undergraduate studies: goals, courses of study, resources, over-crowding, rising student expectations and continuing education. Quite the contrary. However, the many questions as to the goals and the means of planning and developing graduate studies, particularly in the social sciences, may be asked of the whole university as well, and the university will have to answer these questions through in-depth adjustments. In devoting ourselves exclusively to an examination of the latter questions, we are in no way minimizing the importance of the former on which, in a number of cases, our analyses have shed new light.

The directions in research most likely to affect universities are increasingly determined by broad shifts in public opinion and expectations. It is not known at present how the university will succeed in reconciling the necessary responses to the many and often contradictory demands made of it and still safeguard its autonomy, so that it will be able to fulfil its purpose even in the face of severe limitations, now and in the future.

4. Procedures

From our first contacts with the university environment, we noted on the part of many people a great deal of interest and a strong desire to cooperate in our study. Thus we have employed a procedure which in some respects differs from that generally followed by commissions of inquiry. Appearing in an appendix is a list of the briefs, documents and studies produced for the commission and, where appropriate, the names of those who worked on them.³⁰ It might be useful to mention briefly the more distinctive features of some of our inquiry methods.

Following the customary practice, we naturally asked Canadian universities to submit briefs, and 40 universities replied. In addition, various groups and individuals spontaneously submitted resolutions or suggestions. By contrast, the Commission, in a departure from traditional practice, did not hold formal public hearings. Instead, its members attended a number of meetings and conferences on topics related to its mandate; they also visited certain universities, at the request of the administration or of groups of professors.

Within the set budget and time limits, the Commission carried out a number of studies of a quantitative or qualitative nature. These studies were defined and carried out in such a way as to answer questions which have not until now received the attention they merit. The Commission carefully read the inquiry reports and studied a number of secondary sources, both Canadian and foreign, relevant to its work.

Furthermore, we sought to penetrate closer to the heart of the university by trying to directly involve professors, students and a number of learned societies. In this way we devised the plan of working groups made up of professors and, in some cases students, in eight universities, as well as the disciplinary studies project carried out for the Commission by six learned societies. In both cases, we were anxious to co-operate as closely as possible with those in charge of these particular studies. These groups very often took the initiative of organizing meetings of professors and students, in which specialists in the social sciences and the natural and health sciences were brought together, in order to discuss questions relating to the purpose of their studies. Some learned societies held similar meetings with their members. Because of their number and lack of formal organization, it was much more difficult for us to reach students directly. Nevertheless, working sessions held by two of our research assistants in 10 universities enabled us to gain a better knowledge and understanding of their needs and wishes. The report would have been quite different without the often lively exchanges of opinion between professors and students, and if we had not had access to the students' carefully prepared, perceptive reports.

All those who have previously discussed universities have come up against the same difficulty - inadequate and inaccurate data on most of the topics they wished to study. Whether the topic was students, professors, courses of study at various levels, operating credits or capital investment, they were often forced to work with outdated statistics, which differed from one source to another or were of dubious value. Research departments in universities collect data on the basis of the aims of the institution concerned, and government departments do the same. Statistics Canada and international data centres use classifications defined for other purposes. Moreover, the clear impression is left that the responsible organizations themselves are in a way to blame for this state of confusion. Until recently, no one in

the universities, administration, media, or general public had made a serious attempt to discover the real situation in the universities; everyone accepted the blurred, if not incoherent, image created by the data coming from various sources.

For several reasons having to do with present cultural, economic, social and political circumstances, the time of this deplorable carelessness is past. From now on we must seek a precise, accurate picture of the university. It will take several years before a complete picture is available. In collecting data, sometimes we were forced, as others have been, to resort to less than reliable sources, and we have filled in the gaps as best we could. We have used, and perhaps abused, figures and percentages. This was a deliberate choice. Every discipline, every region, and every university has had to get its bearings and evaluate its performance with respect to all components and in all activities of graduate studies in the humanities and social sciences.

Before we get involved in the intriguing but chancy game of numbers, a word on the nature of the sources and the problems encountered in using them. Statistics Canada, the Association of Universities and Colleges of Canada, the Canadian Association of Graduate Schools, each university and the OECD provided closely matched figures on student enrolment. For some areas and some years, however, the differences were considerable, and even for a question as simple as enrolments at different levels the figures may differ by more than 10 percent. Statistics Canada data are more complete and go back further in time; thus they generally lend themselves more readily to comparison than do other data. Data from the Canadian Association of Graduate Schools, on the other hand, contain more information on individual disciplines and universities. It has been possible on occasion to compare data from these two organizations with certain university statistics. There again, the figures do not agree, and differences may be more than 10 percent.

There are other difficulties related to the definition of a university. Even the number of universities in Canada varies according to source. In addition, the provinces have not adopted uniform categories for designating university students. Thus, at the undergraduate level in particular, there are still noticeable differences between provinces in this regard, and even differences within a province.

Statistics Canada provides data on institutions which grant graduate degrees. Aside from information on educational institutions, these statistics relate to affiliated institutions which grant graduate degrees.

For the master's and doctoral levels, the statistics are presented in such a way as to distinguish easily between those of the principal institution and those of affiliated institutions. At the undergraduate level, the situation is much more complex. In some provinces, postsecondary institutions, such as the community colleges in Ontario, the CEGEPs (Collèges d'enseignement général et professionnel) in Quebec, and junior colleges in Alberta and British Columbia, offer parallel courses leading to undergraduate diplomas. Moreover, reforms in the structure of postsecondary education in Quebec at the end of the '60s, and in the Western provinces at the beginning of the '70s, have led Statistics Canada and the provincial agencies to update their methods of data collection, thereby affecting chronological orders. As a result, in years in which these structural changes were made in a province, the bases of calculation were abruptly altered, making comparisons with other provinces for given time periods very difficult. For example, the transformation of higher education in Quebec in the late 1960s and early 1970s created real problems of data classification. By 1973, most of these issues had become resolved, but by then the emphasis was on collecting future data, not on standardizing the data produced in the period of transformation. Accordingly, data on this period of change may not be as comparable with preceding or subsequent data as one might wish.

In the example cited, as in many others, great care is required in using the figures and percentages. Precautions taken in collecting and analyzing data have enabled us to reduce the margin of error to a minimum. But we have a feeling that it will be easy for the universities to refute those statements which may not suit them. They will merely have to claim that the statements are based on obsolete data or on data different from those produced by their own studies. What can be done to counter such claims? Let us hope the causes which may have misled us will soon be eliminated and that, if we cannot always agree on the interpretation to be given to certain facts, at least these facts will be irrefutable.

5. Plan of Report

In order to reach any accurate conclusion on graduate studies in the humanities and social sciences, we must first place them in the general context of the university and in the framework of graduate studies. On the subject of students, we shall examine the growth in numbers, and their needs and wishes. We shall proceed in a similar fashion for professors. At another stage of the report, we shall discuss university research, its distinctive characteristics, costs, justification and the organizations subsidizing it. Underlying these reports will always be a special question, that of relations between research and teaching. Another section will deal with science policy, its foundations and limitations, and the reform of federal research organizations. Also under study will be federal-provincial relations in the field of graduate studies, the present trend toward "provincialization" of graduate studies and the special case of Quebec. In conclusion, we shall be dealing with the foreseeable future of graduate studies and will seek to establish an optimal growth threshold which will enable them to reach a suitable "cruising speed."

This will be the outline followed:

- 1) the university and graduate studies,
- 2) research,
- 3) science policy.

Notes

1. See Appendix I for the text of the mandate.
2. John B. Macdonald, The Role of the Federal Government in Support of Research in Canadian Universities, Special Study No. 7, prepared for the Science Council of Canada and the Canada Council (Ottawa: Queen's Printer, 1969), 361 p.; Louis-Philippe Bonneau and J.A. Corry, Quest for the Optimum. Research Policy in the Universities of Canada. The Report of a Commission to Study Rationalization of University Research (Ottawa: Association of Universities and Colleges of Canada), vol. I, 1972, 207 p.; vol. II, 1973, 67 p.; René Hurtubise and Donald C. Rowat, The University, Society and Government. The Report of the Commission on the Relations Between Universities and Governments (Ottawa: University of Ottawa Press, 1970) 252 p.; Government of Canada, A Science Policy for Canada, Report of the Senate Special Committee on Science Policy, vol. 2, Targets and Strategies for the Seventies (Ottawa, 1972) pp. 329-608. The Council of Ministers of Education of Canada mentions 21 inquiries into one or another of the many facets of education at the provincial level between 1945 and 1973.
3. Government of Canada, A Science Policy for Canada, vol. 2, p. 439. The legislation authorizing the appointment of the new Social Sciences and Humanities Research Council was passed in 1977.
4. "Science et société: Le colloque de Saint-Paul-de-Vence", Le Progrès scientifique, no. 160, January 1973.
5. Natural science specialists now know quite well that scientific activity is pursuing the goal of transcendence, that it does not take place in a closed system and that the scholar is accountable to the larger society. If we are to believe W. Rosenblith, "... in our era a new chapter in the history of science has just begun, a chapter characterized by the growing use of scientific knowledge, and from this point on it is no longer up to scientists alone, but up to all of society to decide on the point at which science, as it ceases to be the activity of a few individuals, begins to involve social responsibilities." [Translation] In "Science et société: Le colloque de Saint-Paul-de-Vence", p. 72. For the social sciences, see Eugene J. Meehan, Value Judgment and Social Science (Homewood, Illinois: The Dorsey Press, 1969).
6. Jean Ladrière, "Les finalités de l'université", in Dieter Berstecher and colleagues, L'université de demain (Paris-Brussels: Elsevier-Séquoia, 1974), p. 38.
7. Philip E. Mosely, "The University and Public Policy", in Stephen D. Kertesz, ed., The Task of the Universities in a Changing World (University of Notre Dame Press, 1971), p. 34. Also Alvin C. Eurich, ed., Campus 1980: The Shape of the Future in American Higher Education (New York: Delacorte Press, 1968).

8. Theodore M. Hesburgh, "The Nature of the Challenge, Traditional Organization and Attitudes of Universities toward Contemporary Realities", in Stephen D. Kertesz, ed., The Task of the Universities in a Changing World (University of Notre Dame Press, 1971), p. 3.
9. Quoted in Laurence R. Veysey, The Emergence of the American University (Chicago, 1965), p. 7.
10. David Martin, "The Dissolution of the Monasteries", in David Martin et al., Anarchy and Culture: The Problem of the Contemporary University (Columbia University Press, 1969), p. 2.
11. Douglas T. Kenny, "The University and the Longer View", inaugural address delivered on the occasion of the installation of Dr. Kenny as seventh president of the University of British Columbia.
12. Quoted in Veysey, Emergence of the American University, p. 121.
13. Jean-Jacques Salomon, Science et politique (Paris: Editions du Seuil, 1970), p. 12.
14. OECD, Secretary-General's Ad Hoc Group on New Concepts of Science Policy, Science, Growth and Society. A New Perspective (Paris, 1971), p. 18; Norman W. Storer, The Social System of Science (New York: Holt, Rinehart and Winston, 1966), p. 35. In The Structure of Scientific Revolution (The University of Chicago Press, 1970), Thomas S. Kuhn distinguishes two kinds of science, "standard science" and "revolutionary science," which differ in that the paradigms proposed by the latter have not yet been recognized in general theory.
15. Louis Althusser, quoted by Jean-Jacques Salomon, op.cit., p. 13.
16. Max Weber, quoted by Robert K. Merton, Social Theory and Social Structure (New York: Glencoe Free Press, 1957), p. 537. Also Talcott Parsons, The Social System (New York: Glencoe Free Press, 1951), pp. 335-345; Joseph Needham, The Grand Titration: Science and Society in East and West (London: George Allen and Unwin, 1969) and L. Marsak, ed., The Rise of Science in Relation to Society (New York: Macmillan, 1964); Unesco, La science et la diversité des cultures (Paris: Presses Universitaires de France, 1974). Joseph Ben-David writes in this regard: "Countries may naturally reject science, but it is very unlikely in such a case that they will be able to keep their civilization alive." La recherche fondamentale et les universités (Paris: OECD, 1972), p. 57. J.W. Grove has presented an excellent rebuttal to the claim of science to be a superior form of knowledge, stating: "A typical 'scientistic' claim is that science is a superior form of knowledge ... This is nonsense ... There are many ways of knowing the world, and the scientific way is an intellectually fruitful and powerful one. But it is impossible, in my opinion, to adjudge it superior in any meaningful sense. The artist's vision and the poet's vision are at least as important, and I do not believe that there are many scientists of repute today who should assert that science is superior in

any absolute sense; they would assert merely that it is obviously superior in that region of experience to which it relates. In any event, although science contributes to knowledge, the notion that the only true or important knowledge is scientific knowledge is clearly false." J.W. Grove, "Science Policy and the Attacks on Science", in B. Chapman and A. Potter, eds., Political Questions; Essays in Honour of W.J.N. Mackenzie, (Manchester: Manchester University Press, 1974). In contrast, it would seem that cultures have always required a share of scientific demands, in the broad sense of the term. The great French ethnologist, Lévi-Strauss, shattered the longstanding myth of prelogical mentality.

17. Robert Nisbet, "The Impact of Technology on Ethical Decision-Making", in Jack D. Douglas, ed., The Technological Threat (New Jersey: Prentice-Hall, 1971), p. 39. Also Karl W. Deutsch, "Scientific and Humanistic Knowledge in the Growth of Civilization", in Leonard M. Marsak, op.cit., pp. 146-150.
18. William Leiss, The Domination of Nature (New York: George Braziller, 1972). Also Moody E. Prior, "Bacon's Man of Science", Journal of the History of Ideas, vol XV, 1954; René Dubos, Reason Awake: Science for Man (New York: Columbia University Press, 1970); John Black, The Dominion of Man: The Search of Ecological Responsibility (Edinburgh: The University of Edinburgh Press, 1970).
19. Norman W. Storer, The Social System of Science (New York: Holt, Rinehart and Winston, 1966), pp. 1-2; also D.O. Edge, J.N. Wolfe, Meaning and Control: Essays in Social Aspects of Science and Technology (New York: Tavistock, 1973) and R.J. Forbes, The Conquest of Nature: Technology and Its Consequences (New York: Praeger, 1968).
20. Unesco, La science et la diversité des cultures (Presses Universitaires de France, 1974), p. 26.
21. Unesco, op.cit., pp. 31-32.
22. Max Weber, The Protestant Ethic and the Spirit of Capitalism (New York: Charles Scribner's Sons, 1958). Translated from the German by Talcott Parsons.
23. Robert K. Merton, op.cit. For discussions of Merton's position, see Leonard M. Marsak, op.cit., pp. 21-66. In their analysis of conditions favoring major advances in social sciences, Karl Deutsch and his colleagues conclude that concrete problems and conflicts stimulated about three-quarters of the scientific achievements from 1900 to 1965, with the stimulating effect being two-thirds before 1938 and four-fifths after that date. See Karl W. Deutsch et al., "Conditions Favoring Major Advances in Social Science", Science, vol. 171, February 1971, p. 458.
24. Godfrey Harold Hardy, A Mathematician's Apology (London: Cambridge University Press, 1940).
25. Jean-Marc Lalancette et al., Les objectifs de la recherche universitaire (Quebec City: Conseil des universités du Québec, 1974), p. 8, pp. 80-98.

26. Jean-Jacques Salomon, *op.cit.*, pp. 117, 122. H. Brooks is even more categorical in describing the relationship of science to contemporary civilization as very similar to that between the major artistic and philosophical achievements of the Greeks and their society, or between the great cathedrals and medieval Europe, and adding that in a certain sense science not only served the goals of society, but was itself one of the goals of our society. In Basic Research and National Goals (Washington: National Academy of Sciences, 1966), p. 85.
27. Robert E. McGarrah, "The University Updated", Journal of Higher Education, no. 44, February 1973, pp. 137-147.
28. Philip E. Mosely, "The University and Public Policy", in Stephen D. Kertesz, ed., The Task of the Universities in a Changing World (University of Notre Dame Press, 1971), p. 34.
29. These statements will underlie the entire report. We are aware that this position is not ours alone - many others have adopted it before us. This in itself confirms the validity of the approach. For similar ideas, see, among others, Gustave D. Arlt, "The Future of Graduate Education", Education, vol. 92, 1972; Léon Dion, "Politique et science politique", Revue canadienne de science politique, vol. VIII, no. 3, 1975, pp. 367-380; Emil Lucki, "Graduate Education in the Next Three Decades", in L.J. Kent, G.P. Springer, eds., Graduate Education Today and Tomorrow (University of New Mexico Press, 1972), pp. 69-77; OECD, The Research System, vol. 3, Canada-United States. General Conclusions (Paris, 1974), pp. 9-30, 181-214; Ronald L. Watts, "Freedom with Responsibility: Universities, Governments and the Public", Queen's Quarterly, vol. 82, no. 1, Spring 1975; IAU Secretariat, The University and the Needs of Contemporary Society (Paris: IAU, 1970), pp. vii-xiv; J.P. Powell, "Universities as Social Critics", Higher Education, vol. 3, 1974.
30. See Appendix II.

SECTION ONE

The Canadian University and Graduate Studies
in the Field of Humanities and Social Sciences

INTRODUCTION

The first Master of Arts degrees were awarded in 1845 at King's College, an affiliate of the University of Toronto and, soon after, McGill University conferred master's degrees for the first time. Forty years later, other universities, such as Queen's in 1889, joined this select group. It was only much later, however, that coherent graduate studies programs were designed in Canadian universities. Yale granted its first PhD degree in 1861. Basing themselves on the German model, Harvard in 1872 and Johns Hopkins in 1876 developed the first graduate studies programs in America. In 1900 there were in the United States 50 accredited universities conferring the Doctor of Philosophy degree.¹ In Canada, however, it was not until 1922 that the first school of graduate studies was established at the University of Toronto. But both the University of Toronto and McGill University, whose development closely follows the former, have displayed rather little interest in graduate studies and research. These two teaching institutions, nowadays as in the past the most important in the country in many respects, have considered themselves as undergraduate institutions and have acted accordingly. The Task Force set up at the University of Toronto for our Commission indicated:

As late as 1955, the University of Toronto was primarily an undergraduate institution to which a small graduate program was attached.²

What applies to the University of Toronto and McGill University is even more applicable to the two oldest francophone universities, Laval University and the University of Montreal. Except for a few sectors, structural and creative changes have been so slow in materializing that even these older universities consider themselves today as, first and foremost, undergraduate institutions. This also applies to more recent universities.

Yet the changes which numerous universities have undergone over the last 15 years are extensive. Official addresses increasingly stress the "primary" importance of graduate studies and the research "output" as an indicator of the quality of universities. This rhetoric is not unfounded and corresponds to a slow evolution in the minds of people. Claude Bissell, who contributed so greatly to the unparalleled growth of the University of Toronto during his 13 years as president (1958-1971), clearly expresses this new consciousness:

The school of graduate studies is the fighting edge of the university upon which its scholarly reputation largely depends.³

In a good number of cases, the germination period of graduate studies is past, at least in some sectors. Elsewhere, it is continuing. Another period, that of orientation and consolidation, holds new promise but faces new constraints. Choices will need to be made and already scarce resources redistributed.

Increasingly in Canada, as has been the case in the United States for a long time, the value of the university is measured by the importance of graduate studies and research. Thus, the working group at Queen's University states, The ideal university is not only vitally concerned with teaching - the transmission of knowledge - but also with research - the discovery and the integration of new knowledge... It must guard, critically assess and creatively reconstruct our aesthetic, moral, social and political values.⁴

Of course, graduate studies develop differently at each university. They are not the same at the University of Toronto and at York University, at Laval and at the University of Quebec at Montreal, at the University of British Columbia and at Memorial or Dalhousie. Our analyses and recommendations will take into account differences of age and location.

In all cases, the establishment and development of graduate studies in a university is an extremely complex endeavour resulting in a transformed university environment: establishment of new bodies in the basic teaching units or at the intermediate or senior administration levels of the university; creation of new, competitive relations within the university; new interest groups struggling to obtain as many material and human resources as possible; doubts or even conflicts with regard to the graduate studies program and the promotion of students from the undergraduate to other levels; uncertainty about the extent of graduate employment in the marketplace; concern that governments will fail to recognize the particular value and specific needs of graduate studies. In short, the establishment and development of graduate studies upsets the traditional equilibrium, hence the need for accommodations enabling the coexistence, under one administration, of undergraduate, graduate and even post-graduate studies as well as scientific research.

The rate and mode of development are very different for the natural sciences, and for the humanities and social sciences. The theoretical and

methodological foundations of the former are much more solidly based than those of the latter; the status of scientific, free and mission-oriented research also is much better defined. Thus, graduate teaching and research are much more closely linked in the natural sciences than in the humanities and social sciences. In addition, until the last few years, the funds allocated to research in this latter sector constituted only a very small fraction of the overall expenditures on scientific university research and, except in a few universities, this imbalance has yet to be corrected. In most Canadian universities, the design and organization of graduate studies are based on criteria established for the natural sciences. The humanities and social sciences therefore must adapt to this constraining situation; however, as they become more self-confident and more conscious of their original nature, human science specialists begin to question the model of natural scientists.

The expansion of graduate studies in the human sciences creates another problem equally important but of a different kind. An additional hierarchy of universities will probably emerge, as was the case a short time ago in the United States. American universities are graded and it is the quality of graduate studies, not the value of undergraduate programs, which determines the rank assigned to each university. This is a cumulative process. Generally, where both fields of study coexist, the most renowned universities in natural sciences are also renowned for their humanities and social sciences; similarly, universities with a poor reputation in the first field have the same reputation in the other.⁵

This same phenomenon does not necessarily occur in Canada. However, if this phenomenon were based on a kind of intrinsic law, we could hardly avoid it. The quality of the natural sciences may have positive effects on the humanities and social sciences; however, the existence of a major gap between the two sectors would undoubtedly result in serious internal tensions and damage the image of universities. Nevertheless, in view of the exceptionally vigorous traditions in the natural and health sciences of universities such as McGill, or even as a result of the extensive difficulties inherent in the existing development of the social sciences, it remains possible that Canadian universities would not conform to the American model on this point.

We cannot accurately specify to what extent Canadian universities have

become aware of the effects of qualitative and quantitative changes resulting from the development of graduate studies in the humanities and social sciences. We believe these effects have been considerable.

This section will describe the extent of growth of graduate studies in the humanities and social sciences. Following brief comments on the evolution of the university in Canada, an analysis of students and professors and an outline of the quantitative growth of graduate studies, we will describe the specific objectives of these studies and their mode of organization. We will then examine the humanities and social sciences within graduate studies and deal with their programs.

Notes

1. Laurence Veysey, The Emergence of the American University (Chicago: University of Chicago Press, 1965); Alvin C. Eurich, The Shape of the Future in American Higher Education (New York: Delacorte Press, 1968), P. 98; Oliver C. Carmichael, Graduate Education: A Critique and a Program (New York: Harper and Brothers, 1961); Christopher Jencks and David Riesman, The Academic Revolution (New York: Doubleday, 1968).
2. Task Force for the Canada Council Commission on Graduate Studies in the Humanities and Social Sciences, University of Toronto Report, Toronto, 1975, (unpublished), p.2. For an outline of the beginnings of graduate studies at the University of Toronto, see the Report of the President's Committee on the School of Graduate Studies, Graduate Studies in the University of Toronto, Toronto, 1964-1965.
3. Claude Bissell, Halfway up Parnassus. A Personal Account of the University of Toronto, 1932-1971 (Toronto: University of Toronto Press, 1974), p.77. This passage was written in 1961.
4. A Commitment to Excellence. Report of a Task Force on Graduate Studies and Research in the Humanities and the Social Sciences (Kingston: Queen's University, 1975), p. 2.
5. See Bernard Berelson, Graduate Education in the United States (New York: McGraw Hill, 1960), p. 98 et seq. Berelson demonstrates that in the United States, the 12 largest universities have higher requirements for graduate studies than any of the other universities. Moreover, they have a higher rate of success (awarded degrees, completed theses, publications, honours and prizes) and they receive a relatively greater share of research grants. This trend has been confirmed during the last 15 years. However, a careful review of 29 disciplines in 106 institutions reveals a number of exceptions. Some universities are ranked "excellent" in the natural sciences but only "average" in the humanities and social sciences, and vice versa. Also, some institutions specialize in one field or another. See Allan M. Cartter, An Assessment of Quality in Graduate Education, (Washington, D.C.: American Council of Education, 1966), p. 106; also, Kenneth D. Roose, Charles J. Anderson, A Rating of Graduate Programs, (Washington, D.C.: American Council of Education, 1970).

I EVOLUTION OF THE MODERN UNIVERSITY IN CANADA

The modern university came late to Canada. Individual Canadians might share the commitment to utility and research which transformed the university in the United States, and governments and universities might stress the diverse benefits of higher education and graduate training, but institutional changes came slowly, and if we rely on the evidence of statistics on enrolment and research, the modern university was established in Canada only in the last generation. The older ideal survived in part because universities in the United States and elsewhere met the demand for graduate training. Whatever the reasons, however, the modern university is a relatively recent institution in Canada, and this fact has shaped the pattern of its development.

The slow emergence of the modern university in Canada can be briefly illustrated by the changing attitudes toward research. In 1902, President Loudon of the University of Toronto could deplore that "organized research in Canadian universities can scarcely be said to exist as yet, although within the last decade certain beginnings have been made which indicate a movement in that direction."¹ The movement was almost imperceptible. Only two institutions, McGill University and the University of Toronto, had graduate programs before the first World War, and even there the total enrolment was 182 at the master's and 40 at the Phd level. Canadian universities were primarily undergraduate institutions. Graduate studies were the exception although even then a pattern was discernible. Almost all of the PhD candidates were enrolled in the natural sciences, and the regulations covering admission, residence and course requirements were closely modeled on the more highly developed graduate schools in the United States.

Graduate work at Canadian universities remained almost insignificant for the next 40 years, even at the larger institutions. The Dean of Graduate Studies at the University of Toronto in 1934 showed little interest in expansion, arguing that there were too few university appointments to justify admitting more doctoral candidates. In a revealing statement he expressed the opinion that few faculty members wanted to direct research and that graduate training even at Toronto and Montreal was more a response to student demand than to university planning. Even by 1945 only five universities in Canada - Toronto,

McGill, Queen's, Manitoba and Laval - had awarded a PhD degree and there were few signs of change.

The experience of the National Research Council (NRC) also sheds some light on Canadian attitudes toward universities in these years. The Canadian government had become aware of the importance of industrial research during the first World War and had created the Council to provide industry with the benefits of science. In retrospect it seems clear that few of the politicians and industrialists made any distinction between research and development. The scientists on the Council, however, gave a high priority to research and concentrated on the training of scientists through a scholarship program and the conduct of scientific research in the Council laboratories. The existence of the NRC marked a recognition by the federal government of the importance of research, and the Council's contribution to scientific research in Canada was of great significance. But it is nonetheless worth noting that the original emphasis on utility was modified in practice by the emphasis on scholarship. The NRC saw its role as contributing to the advancement of science rather than contributing directly to industrial production in Canada. Few Canadians paid much attention to the NRC at the time; most scientists approved the emphasis on scholarship but otherwise the Council's activities went almost unnoticed. Until more Canadians believed that scientific research was an aspect of international competition and even of national survival, the policies of the NRC would arouse little interest.²

The potential of scientific research was dramatized by the second World War, with its extraordinary development of mines, missiles, radar and bombs. Canadians had participated in some of this research and there was national pride in their achievements, but nonetheless there is little evidence to suggest that the attitude toward science had significantly changed. University full-time enrolment did rise from 36,454 in 1941 to 63,430 in 1951, but this was still only 0.5 per cent of the total population. Nor can it be said that enrolment at the graduate level gave evidence of any widespread interest in research. In 1940-41 there were only 1,755 full-time graduate students at Canadian universities, including master's and doctoral candidates. The number had risen sharply by 1950-51 to 4,270, partly because federal reestablishment policies had encouraged veterans to attend university. By 1955-56, 10 years

after the war had ended, full-time graduate enrolment had declined to 3,127 students. For a country with a population of 16 million that was not an impressive number.

The Royal Commission on National Development in the Arts, Letters and Sciences, more commonly known as the Massey Commission, is an interesting commentary on Canadian attitudes in the postwar decade. The appointment of the commission is in itself revealing. The federal government was clearly concerned with what it saw as the tardy development of academic studies in Canada and believed that some action was needed. The terms of reference, however, did not give any priority to scientific development or suggest that development depended on research. The humanistic tradition was still strong.

The commission then asked eminent scholars to assess the situation in a number of disciplines in Canada. Their opinions are also consistent with the view that scientific research was still not widely seen as a high national priority. An English-speaking Canadian scientist did regret that PhD studies were still largely confined to McGill and Toronto universities and that the best students often went to United States universities, but even he was only mildly critical of the level of scientific research in Canada. "The general claim," he concluded, "is not, then, that science is not good in Canada. It is good but it should be better if we are to develop this country at the rate expected of a modern nation." A French-speaking Canadian scientist noted that his compatriots had shown little interest in the natural sciences in the past but that this was now changing, and his conclusion was that "physical and technical sciences are at present in a very good situation in Canada".³

The scholars who reported on the social sciences in Canada were somewhat more critical. There were too few graduate students and the faculty were so occupied with teaching that they had little time for research. This seemed deplorable because there was the assumption that research in the social sciences would add to human knowledge and produce social benefits. There was no attempt to argue for research as a separate activity, however; it was assumed that a modest increase in research funding would provide an appropriate balance between research and teaching.⁴

The spokesmen for the physical sciences and the social sciences did at least assume that some research was necessary. The scholars reporting to the

Massey Commission on the humanities did not agree. Universities, according to one humanist, should "confine themselves to their proper work of developing intellectual and aesthetic capacity" and should resist higher enrolments and the demand for courses which developed only skills. Another deplored what he considered the rot which had already set in. "Can it be doubted," he asked, "that Canadian universities today exist essentially as technical schools for the training of specialists?"⁵ Even the tentative beginnings of the modern university, with expanded enrolments and an orientation to research, were unwelcome.

As late as 1950, therefore, the Canadian university still seemed to resemble the Canadian university of an earlier generation. In English-speaking Canada it was primarily an undergraduate institution, dominated by the faculty of arts and science. The primary role of the faculty was to teach; research, even in the sciences, was likely to be a supplementary activity or justified because it contributed to teaching. The traditional pattern was changing - enrolment was increasing, new disciplines had appeared in university calendars, younger professors had PhDs and were more likely to want to do research - but these were only portents, encouraging to some and the despair of others. The older traditions were still dominant. Even at the graduate level the changes had been modest. As we have already noted, only five Canadian universities offered any work at the PhD level by 1939. By 1950, six more universities had introduced PhD programs but only two had awarded a PhD degree.⁶ In that year there were more Canadian students studying for the PhD abroad than at home. Canadian universities were attracting some foreign graduate students but graduate studies were still little more than a peripheral activity. Even the University of Toronto as late as 1955 could be described as "primarily an undergraduate institution to which a small graduate program was attached."⁷

The dramatic changes have come in the last two decades. The transformation is implied in statistical comparisons. In 1955-56, for example, full-time university enrolment was just short of 70,000; 15 years later, in 1970-71, it had exceeded 350,000. The profound implication of these figures is underlined by noting that of the age-group 18 to 24, 6.8 per cent were full-time students in 1960-61 but 13.5 per cent were full-time students by 1970-71.

And this, it must be remembered, at a time when postsecondary education at nonuniversity institutions had become common, with an enrolment in these institutions of 49,279 in 1960-61 and of almost 120,000 in 1975-76. Within one generation, postsecondary education in general, and university education in particular, became accepted as a common and almost natural extension of high school training.⁸

No single factor can explain this impressive change. The cold war and the Russian sputnik encouraged an investment in advanced training in technology and research, and postwar affluence made it possible for parents and governments to forego immediate consumption and invest in postsecondary education. But underlying the expanded enrolment was the belief, or the conviction, that education was the key to progress, and that the future of both individuals and nations might depend on the investment in education. University presidents and ministers of education frequently expressed this opinion, but the idea was certainly not confined to the education industry. The Economic Council of Canada, in its Second Annual Review in 1965, included a chapter on education because it saw education as "a crucially important factor contributing to economic growth and to rising living standards."⁹ By the 1960s education, and especially university education, had become a major public enterprise.

One of the results was the increase in the number of universities. In 15 years, from 1960 to 1975, 16 new Canadian universities were founded, bringing the total from 47 to 63.¹⁰ The expansion at the graduate level was even more dramatic. During the same period the number of universities offering graduate programs rose from 28 to 47.

The majority of full-fledged universities in Canada have graduate programs. The percentage for Canada in 1975-76 was 75, with Quebec having 100, Ontario 90, the Atlantic region 75 and the Western region 50. Some of the institutions with graduate programs are fairly specialized, such as the Atlantic Institute of Education, Nova Scotia College of Art and Design, Royal Military College and Collège Dominicain de Philosophie et de Théologie. Others like Brock University, Bishop's University and Mount Allison have very small graduate programs. Only a few universities - such as Toronto, McGill, Montreal, British Columbia, Alberta and Laval - have a graduate program covering a

broad range of academic disciplines.

The Atlantic Provinces have a greater proportion both of universities and of universities with graduate programs than any other region; the number is far out of proportion to the population of the region, particularly in Nova Scotia. In comparison with other regions, the universities in the Atlantic Provinces, though more numerous, also have smaller enrolments. Quebec is at the other extreme: a small number of institutions, but each usually with a large enrolment. Ontario's institutions range widely in size, from the Ontario Bible College to the University of Toronto. Ontario's share of universities with graduate programs is large but not disproportionate to the regional distribution of graduate enrolment. The Western region has a high proportion of universities but a disproportionately low percentage of those with graduate programs. Manitoba, in particular, has a number of small universities but only one, the University of Manitoba, has a graduate program.

If one were to include all the affiliated colleges with the universities listed above, the number of institutions would increase enormously. However the number of institutions with graduate programs would not rise markedly, since most of the affiliated institutions offer only undergraduate programs. (See Appendix III, 1, 2.)

In 1974-75, out of a total of 47 universities with graduate programs, 45 (95.7 per cent) had at least one master's program in a discipline in the human sciences, and 30 (63.8 per cent) had at least one program at the doctoral level. At the master's level, 41 institutions had at least one program each in the humanities and in the social sciences; the corresponding numbers at the doctoral level were 26 and 24. More universities, 36 or 76.6 per cent, had master's programs in history than in any other discipline; economics, education and philosophy tied for second place with 31. At the doctoral level, the corresponding disciplines were: psychology with 21, history with 19, and English language and literature with 18. Disciplines in which few programs were offered included archaeology and communication studies at both the master's and doctoral levels; and, at the doctoral level, social work, administration studies, law, linguistics, classics, anthropology and religious studies.

The extent of coverage of disciplines in the human sciences varies

considerably from university to university and between master's and doctoral levels. Generally, the coverage is much broader at the master's level than at the doctoral level. Only two universities out of the 47 with graduate programs did not offer at least one master's level program in the human sciences, while the number of universities for the doctoral level was 17, or 36.2 per cent, of the 47 institutions. At the master's level, over half and at the doctoral level, over 80 per cent of these universities offered programs with 10 or fewer disciplines in the human sciences, out of 21 disciplines surveyed. Only one university, Toronto, had coverage of 16 to 20 disciplines at the master's level, but only four other institutions did so for this range at the doctoral level (McGill, Montreal, Laval and British Columbia).

Those institutions that have broad coverage at the master's level generally are also well developed at the doctoral level. Regionally, Ontario, Quebec and the West (especially British Columbia and Alberta) are well developed at both levels. The Atlantic region is reasonably strong at the master's level, only through the programs available at Dalhousie and Memorial, but weak at the doctoral level (Appendix III, 3, 3.1, 3.2, 3.3).

This expansion of graduate studies cannot, however, be discussed in isolation. In 1960 all Canadian universities were primarily undergraduate institutions; today some of them are major centres of graduate training as well. But the influence of graduate studies cannot be measured by statistics alone, and even in universities with limited graduate programs the academic attitudes and values reflect the high status and prestige of graduate work.

The changes in the undergraduate programs, for example, are in part a response to the increased importance given to graduate training. Student demands for the elimination of prerequisites and for a wider choice of courses can be seen as an assertion of student autonomy. But it is also significant that these changes permitted a narrow specialization at the undergraduate level and that this specialization was seen by many as an appropriate preparation for graduate work. The extraordinary proliferation of undergraduate courses is also linked to graduate studies. New faculty appointments were largely the consequence of increased undergraduate enrolment. The choice, however, often depended more on the candidate's research interests than on his talents as a teacher of undergraduates. The new professor would be

expected to teach at the undergraduate level, but often a new course would be introduced which was close to his research interests. Undergraduates would thus have a choice among more and more courses but the available courses were more and more specialized.

This interdependence of graduate and undergraduate training is thus one of the striking features of the Canadian university by 1970. Any proposed changes at either level should take this interdependence into account.

The transformation of the Canadian university must also be seen in a broader context. Until the 1950s Canadian universities seemed to be playing a relatively minor social role. They provided undergraduate and professional training and governments were prepared to help finance this training; it must be remembered that even then governments were the major source of university funds. During the 1950s, however, the attitude of governments changed. They were committed to expansionist policies and they saw the universities as making a significant contribution to economic growth, both by the training of students which, it was believed, would increase productivity and by research, which was important for defence but which was also expected to improve Canada's competitive position in the world economy. The federal government had already created the National Research Council, and it established the Canada Council to provide capital grants to universities and to support research in the humanities and social sciences. It also contributed operating grants to universities to facilitate their expansion. Provincial governments increased their financial assistance by both capital and operating grants. Financing formulae, which varied in detail from province to province, were devised to encourage increased enrolment and expansion of graduate training. The universities responded enthusiastically. In general they shared the governments' desire for larger enrolment, especially at the graduate level, and eagerly competed among themselves for students, faculty and programs.

Notes

1. Cited in W.P. Thompson, Graduate Education in the Sciences in Canadian Universities (Toronto: University of Toronto Press; Québec: Les Presses de l'Université Laval, 1963), p.3.
2. For the National Research Council, see Mel Thistle, The Inner Ring: The Early History of the National Research Council of Canada (Toronto: University of Toronto Press, 1966) and A Science Policy for Canada, Report of Senate Special Committee on Science Policy, vol. I (Ottawa: Queen's Printer, 1970).
3. B.S. Keirstead and S.D. Clark, Social Sciences, and Maurice Tremblay and Albert Faucher, L'enseignement des sciences sociales au Canada de langue française, Special studies for the Royal Commission on National Development in the Arts, Letters and Sciences (Massey Commission), (Ottawa: Queen's Printer, 1951).
4. J.W. Spinks, "The Natural Sciences"; Léon Lortie, "Les sciences"; in Royal Commission Studies: A Selection of Essays prepared for the Royal Commission on National Development in the Arts, Letters and Sciences (Ottawa: Queen's Printer, 1951), pp. 271, 300.
5. George P. Grant, "Philosophy"; Malcolm W. Wallace, "The Humanities"; Charles de Koninck, "La philosophie au Canada de langue française"; Hilda Neatby, "National History"; and Charles Bilodeau, "L'histoire nationale," in Royal Commission Studies (Ottawa: Queen's Printer, 1951).
6. W.P. Thompson, Graduate Education in the Sciences in Canadian Universities (Toronto: University of Toronto Press; Québec: Les Presses de l'Université Laval, 1963), p. 16. The six were Western Ontario, Alberta, British Columbia, Saskatchewan, McMaster and New Brunswick; Western Ontario and British Columbia had awarded the degree.
7. Task Force for the Canada Council Commission on Graduate Studies in the Humanities and the Social Sciences, University of Toronto Report, Toronto, 1975, p. 2 (unpublished).
8. Education in Canada, Statistics Canada (Ottawa: Queen's Printer, 1973), p. 150; 1975-76 enrolment from Statistics Canada, Advanced Statistics of Education 1975-76 (Ottawa, August 1975).
9. Economic Council of Canada, Second Annual Review: Towards Sustained and Balanced Economic Growth (Ottawa: Queen's Printer, 1965), p. 71.
10. Statistics Canada and Association of Universities and Colleges of Canada, Universities and Colleges of Canada 1975 (Ottawa: Information Canada, 1975), pp. 491-554.

As we mentioned earlier, other sources indicate somewhat different figures. In a document prepared for OECD, the Council of Ministers of Education and the Government of Canada indicate the existence of 66 universities in 1974. See: Council of Ministers of Education, Canada, Review of Educational Policies in Canada (Toronto: Council of Ministers of Education, 1975), 6 vol., prepared in cooperation with the Federal Government. If membership in the Association of Universities and Colleges of Canada is considered the criterion, the number of universities rises to 67.

II GRADUATE STUDENTS

The dramatic expansion of graduate studies in Canada can be illustrated by a few statistics on graduate enrolment. Full-time graduate enrolment, including master's students, was 423 in 1920; 20 years later it was only 1,755. The present scale of graduate training really dates from the 60s, when the emphasis on postsecondary education and the acute shortage of university teachers created a spiralling demand. Between 1960-61 and 1970-71, the number of full-time graduate students rose from 6,518 to 30,815 and the number of part-time students from just over 4,000 to 12,815 (Appendix III, 7). Similarly, in 1960-61 Canadian universities conferred about 300 PhDs and 3,000 master's degrees whereas by the mid-seventies they were awarding some 2,000 PhDs and over 10,000 master's degrees annually (Appendix III, 12-16).

The change was even more dramatic in the humanities and social sciences because initially most graduate training was in the natural sciences. From 1961-62 to 1973-74 the number of PhDs awarded in the humanities rose from 41 to 275 and the number of master's degrees from 463 to 1,527. The expansion in the social sciences was even more accelerated; in the same period the number of PhDs went from 54 to 442 and the number of master's from 1,450 to 6,090.¹

Rapid expansion, however, has not become a way of life, at least not in the humanities. Enrolment at the doctoral level in the humanities has almost leveled off in the 1970s; where there were 1,923 full-time and 821 part-time PhD candidates in 1970-71, there were 1,978 full-time and 996 part-time PhD candidates five years later. At the master's level, enrolment did continue to rise slightly for both full-time and part-time candidates, but again the level of enrolment was almost stable when compared with the pattern of the 1960s. Graduate enrolment in the social sciences, however, has continued to expand although even here the rate of expansion has declined. Full-time candidates at the PhD level rose from 2,533 in 1970-71 to 3,043 in 1974-75; part-time from 984 to 1,753. Enrolment at the master's level in the social sciences also increased in this period.

These statistics only give the magnitude of the enrolment in recent years. Our concern must be with some of the implications of this data. Are the changes in the levels of enrolment accompanied by changing patterns in the

students' choices of universities and in the ways in which they finance their studies? More fundamental, what changes can be seen in their attitudes toward graduate studies, their expectations as students and their expectations after graduation?

Generalizations about students must always be tentative. It is an established tradition, for example, that engineers are unlike artists. Even within the humanities and social sciences the background and aspirations of the students may vary from discipline to discipline. It must also be remembered that graduate studies in Canada at the present level of enrolment is a recent phenomenon. Students have had to cope with situations for which there are no established patterns or precedents. We are only now beginning to see how the changes have affected the students themselves, the institutions in which they are enrolled and the society to which they belong.

Our comments will therefore be limited to some of the broader trends which can be identified and to some generalizations about student attitudes which seem to us to be significant. We have had the benefit of a survey of postsecondary students in Canada and also a Commission study of the opinions of graduate students on a number of topics.

The Post-Secondary Student Survey was conducted by Statistics Canada in the spring of 1975 in conjunction with the Department of the Secretary of State. The survey was designed to elicit information on access to higher education, geographical mobility, student finances and occupational preferences.² Our Student Opinion Survey was based on one-day discussions among a few selected graduate students at seven English-language universities and two French-language universities, where the aim was to elicit opinions on and attitudes toward graduate studies.³

1. Personal Background of Doctoral Students

A brief introduction to the doctoral students as a group may be in order because it is easy to forget that we are not dealing with a group of immature young people. In 1974-75 there were 13,116 students enrolled in doctoral programs in Canada, 59.2 per cent of them in the humanities and social sciences. The average age of these students was about 30 and almost three out of every five were married. It is also noteworthy that 30 per cent of them were

part-time students and only 24 per cent were women. When we take the doctoral candidates in the humanities and social sciences separately, we learn that on the average they were older (31 years), more often married (62%), more often part-time (35%) and more likely to be women (33%).

2. Choice of University and Program

Most Canadian doctoral students who enrol in a Canadian university do so in the region of their permanent residence. Students in the humanities and social sciences were more mobile than those in the natural sciences but the striking difference was the variation between regions, with students from the Atlantic region showing a much more marked tendency to enrol in universities in other regions of Canada.

Table 1

Percentage of Doctoral Students Enrolled in Universities Located in Their Home Region 1974-75

Region of Permanent Residence	Human Sciences	Natural Sciences
Atlantic region	39.2	75.5
Quebec	89.3	91.6
Ontario	94.3	94.9
Western Region	83.1	92.3

Source: Statistics Canada, in cooperation with Secretary of State Department, Post-Secondary Student Survey 1974-75, unpublished data.

The majority of those students who did leave their own region went to Ontario; most of the Ontario students who left their home province went to Quebec.

There has been a significant decline over the last decade in the number of Canadian graduate students who have chosen to study outside of Canada (Tables 2 and 3). The greatest change has been at universities in the United

Table 2

Canadian Students in Foreign Countries by Field of Study in 1966

	Humanities, Education & Fine Arts	Social Sciences & Law	Natural & Life Sciences	Medical Sciences	Total
Africa	6	-	-	-	6
Asia	48	12	28	1	89
Austria	9	1	1	6	17
Belgium	33	16	3	18	70
Denmark	5	-	1	1	7
France	303	35	33	19	390
Germany	60	4	18	6	88
Holy See	125	-	-	-	125
Ireland	12	1	2	3	18
Netherlands	12	2	4	1	19
Spain	8	1	-	-	9
Sweden	2	3	3	-	8
United Kingdom	290	173	236	43	742
Other European countries	10	1	1	2	14
Australia	12	8	33	2	55
U.S.A.	5,315	2,747	3,265	790	12,117
Total	6,250	3,004	3,628	892	13,774

Source: Max von zur Muehlen, Canadian Students Abroad and Foreign Students in Canada, Part I:
 A Statistical Documentation, Department of Secretary of State, Ottawa 1975, Table 2.
 This table was based on data originally prepared by United Nations Educational,
 Scientific and Cultural Organizations.

Table 3

Canadian Graduate Students at United States Universities, 1963-64 to 1973-74

	Professional Degrees	Masters	Doctorates	Total
1963-64	593	1,268	1,125	2,986
1964-65	707	1,327	1,288	3,322
1965-66	788	1,392	1,409	3,589
1966-67	1,314	1,636	1,670	4,620
1967-68	1,246	1,733	1,813	4,792
1968-69	1,447	1,974	1,747	5,168
1969-70	1,369	2,122	1,716	5,207
1970-71	1,902	1,821	1,531	5,254
1971-72	1,110	1,787	1,316	4,213
1972-73	1,793	1,143	1,023	3,959
1973-74	2,099	737	517	3,353

Source: Max von zur Muehlen, Canadian Students Abroad and Foreign Students in Canada, Part I: A Statistical Documentation, Department of Secretary of State, Ottawa 1975, Table 4. This table was based on data appearing in Institute of International Education's (New York) Open Doors.

Note: The data given here represent enrolment in 80% of the U.S. universities. The sharp downfall in doctoral and master's enrolment may be due to some extent to changes in reporting.

States, where increases were reported in Canadian doctoral candidates enrolled from 1963-64 to 1967-68 but steady declines from then on. This decline is presumably associated with the development of better graduate programs in Canada and possibly also with increases in fees and living costs for American universities. Enrolment in European universities, while smaller than in the United States, has followed a slightly different pattern. The enrolment of Canadian students has not increased significantly but nor has there been a marked decrease. The data on Canadian students abroad is far from adequate, but it seems probable that many of them are in the humanities, studying the literature or history of the country in question. The pattern of the last decade, however, does suggest that Canadian universities are becoming more and more responsible for the training of Canadian graduate students and that the range and the academic standards of programs will largely determine the qualifications of Canada's scientists and professionals in the future.

Canadian graduate students attending universities abroad are outnumbered by graduate students from abroad who are studying in Canada (Table 4). In 1973-74, almost 4,500 PhD candidates at Canadian universities and more than 7,000 master's candidates were classified as either landed immigrants or foreign students. These figures are all the more remarkable because they represent approximately one-third of the total PhD enrolment and about one-fifth of the total MA enrolment at Canadian universities. The largest number of foreign doctoral students (i.e. those whose permanent residence is outside of Canada) chose to study in Ontario, followed by Quebec and the Western region. Ontario and Quebec attracted three-quarters of all the foreign doctoral students in 1974-75. It is clear however that the proportion of foreign students or landed immigrants in the natural and medical sciences is significantly higher than in the humanities and social sciences.⁴

The Post-Secondary Student Survey also throws some light on the factors which influence the choice of university. Both undergraduate and graduate students identified the type of program offered by the university as the leading reason, followed by the closeness of the university to their home and the teaching reputation of the university. Part-time students, both undergraduate and graduate, not surprisingly gave more importance to the location of the university although otherwise the factors which influenced their

Table 4

Full-Time Foreign University Students
by Country of Origin and by Level, 1973-74

	Undergraduates	Masters	Doctorates	Total
China	192	24	10	226
England	214	82	23	319
France	76	179	50	305
Guyana	215	28	2	245
Hong Kong	2,908	128	18	3,054
India	85	205	164	454
Jamaica	164	35	10	209
Malaysia	314	56	32	402
Nigeria	149	108	47	304
Tanzania	109	36	5	150
Trinidad and Tobago	940	86	29	1,055
United Kingdom	1,344	202	50	1,596
U.S.A.	2,111	907	382	3,400
Vietnam	215	52	41	308
Subtotal	<u>9,036</u>	<u>2,128</u>	<u>863</u>	<u>12,027</u>
Other countries	5,144	1,021	494	6,659
Total	<u>14,180</u>	<u>3,149</u>	<u>1,357</u>	<u>18,686</u>

Source: Max von zur Muehlen, Foreign Students in Canada, Department of Secretary of State, Ottawa 1975, Table 8. This table is an estimate based on Statistics Canada data.

choice followed the same order.

Table 5

Most Important Reason Given by University Students
for Choice of Institution, by Type of Student, 1974-75

Reason	Undergraduate		Graduate		Professional
	Full %	Part %	Full %	Part %	
Type of program	35.9	36.2	36.8	42.0	20.3
Close to home	19.1	36.6	12.8	26.2	17.8
Teaching reputation of institution	15.3	8.7	10.1	11.9	24.5
Research reputation	1.2	0.5	9.5	2.4	0.7
Cost of attending	2.6	0.7	1.8	0.8	1.7
Language of instruction	1.2	0.5	0.6	0.7	0.4
Other*	24.7	16.8	28.4	16.0	34.6
<u>Total Per Cent</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
<u>Total Number (000)</u>	<u>269.0</u>	<u>78.7</u>	<u>40.4</u>	<u>21.8</u>	<u>19.2</u>

* Including influence of parents, teachers, friends; size of institution; financial aid available from institution; away from home; accepted by institution; and other.

Source: Department of Secretary of State, Education Support Branch,
Some Characteristics of Post-Secondary Students in Canada,
Ottawa 1976, Table 2.4.

The doctoral students attending Canadian universities diverged slightly from this pattern. The type of program was still the most important consideration for the candidates in the human sciences, followed by teaching reputation of the university. For the doctoral students in the natural sciences, however, the research reputation of the university was rated as the most important factor, followed closely by the type of program. In each case the financial aid available from the institution was a more significant factor than for the undergraduate and graduate students as a group.

Table 5a

Most Important Reason Given by Doctoral Students for Selecting
University at Which to Pursue Doctoral Studies
in Human and Natural Sciences, 1974-75.

Single Most Important Reason	Students Choosing Each Reason in:					
	Human Sciences		Natural Sciences		Total (all fields)*	
	Rank	%	Rank	%	Rank	%
Type of program offered	1	33.6	2	25.5	1	30.1
Teaching reputation of university	2	12.2	6	5.0	5	9.0
Research reputation of university	3	10.4	1	25.5	2	16.6
Institution close to home	4	10.2	4	8.3	4	9.8
Financial aid available from university	5	10.1	3	11.6	3	10.7
Accepted by institution	6	7.6	5	6.0	6	7.0
Subtotal		<u>84.1</u>		<u>81.9</u>		<u>83.2</u>
Others (less than 2% per single reason)		15.9		18.1		16.8
Total		<u>100.0</u>		<u>100.0</u>		<u>100.0</u>

* Includes fine arts and others.

Source: Statistics Canada, in co-operation with Secretary of State Department, Post-Secondary Student Survey 1974-75, unpublished data.

The students' reasons for choosing the programs in which they were enrolled is of special interest, all the more so when it is remembered that the type of program is such an important factor in the choice of university. Again the pattern for undergraduate and graduate students is very similar, with an interest in broadening knowledge in first place, followed by interest in career advancement, followed by employment prospects and by income prospects.

Table 6

Most Important Reason Given by University Students
For Choice of Program, by Type of Student, 1974-75

Single Most Important Reason	Undergraduate		Graduate		Professional
	Full %	Part %	Full %	Part %	%
Broaden knowledge	34.7	38.6	37.6	38.1	16.8
Career advancement	23.8	30.0	25.4	33.5	31.3
Employment prospects	13.5	10.2	9.4	7.9	17.2
Income prospects	3.2	6.7	1.3	3.7	3.2
Other*	24.8	14.5	26.3	16.8	31.5
<u>Total Per Cent</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
<u>Total Number (000)</u>	<u>269.0</u>	<u>78.7</u>	<u>40.4</u>	<u>21.8</u>	<u>19.2</u>

* Includes influence of parents, teachers and friends; cost of program; difficulty of program; academic background and other.

Source: Department of Secretary of State, Educational Support Branch,
Some Characteristics of Post-Secondary Students in Canada,
Ottawa 1976, Table 2.3.

The doctoral candidates showed the same order of priorities for choosing their program of studies. For the doctoral students in the human sciences, however, there was a greater emphasis on the broadening of knowledge and a reduced emphasis on economic prospects.

Table 7

Most Important Reason Given by Doctoral Students
for Choosing Present Program of Study, 1974-75

Single Most Important Reason	Human Science Doctoral Students	Natural Science Doctoral Students
Interest in broadening my knowledge	44.5%	38.5%
Interest in career prospects or career advancement	22.4	25.2
My academic background fitted in well with program chosen	7.0	8.5
Good employment prospects	4.3	7.2

Source: Statistics Canada, in cooperation with Secretary of State Department, Post-Secondary Student Survey 1974-75, unpublished data.

It is possible to interpret the responses in a number of ways but it is clear that the students themselves express far more interest in personal development than in economic benefits.

3. Finances

The financial situation of graduate students is of central importance. How much money do graduate students earn, how much of their income comes from their family, how much from public sources, and how much money do they have to borrow to meet the costs of graduate training? And how do they spend their money? How different are the financial profiles for full-time and part-time students, for single and married students? To what extent does enrolment in graduate studies or the completion of graduate studies depend on finances? There can be no simple answers to these questions but the Post-Secondary Student Survey does at least provide a great deal of data on the financial situation of the students enrolled in doctoral studies in 1974-75.

There is no common pattern for the expenditures of doctoral students. In 1974-75, the average annual expenditure was close to \$6,000, with only about

10 per cent going to direct academic expenditures such as fees, and with more than half going to food and accommodation. There was a significant difference, however, between the nonacademic expenses of married and single students and also between those of part-time and full-time students; the average expenditure of a single, full-time doctoral student was around \$4,000, whereas for a married, part-time student it was over \$8,000. In every category, the average expenditure of students in the human sciences was higher than in the natural sciences. The most probable explanation is, as we have already noted, that doctoral students in the human sciences tend to be older, that a higher proportion are married and that more of them are working part-time (Tables 8 and 9).

The sources of income for these doctoral students are even more diverse. Their money may come from scholarships, from a job outside the university, from university employment, from personal savings, from the spouse's income, from parents or by borrowing money. With such a variety of sources it would actually be misleading to present the data in the form of averages. A few comments on the major sources of income will be more informative.

The single students with Canada Council awards appear to have no serious financial difficulties. The average value of a Canada Council award in 1975-76 was \$6,345, some \$300 less than the average expenditure of doctoral candidates in the human sciences two years before (Tables 10 and 11). It must be remembered, however, that these recipients are among the favored few. Of a total of approximately 5,700 eligible full-time doctoral students in Canada only 868 received Canada Council fellowships for 1975-76 (Tables 10 and 11). The Post-Secondary Student Survey provides a different perspective. Most students did not have a single source of funds and relied on varying combinations of diverse sources. For those who did receive federal funds the average award was close to \$4,000; the next highest level of support came from spouses of graduate students, followed by part-time jobs. The average levels of provincial or other scholarships, savings or aid from parents were far short of the costs per student of a year at university. Individual students relied on whatever sources were available to them.

The category of students who borrowed money is perhaps the most revealing. Over one-half of the doctoral students did not apply for loans even though

Table 8

Finances per Average Doctoral Student, by Field of Study, 1974-75

Financial Item	Human Sciences			Natural Sciences			All Fields		
	\$ 0 Included(1)	\$ 0 Excluded(2)	Difference	\$ 0 Included(1)	\$ 0 Excluded(2)	Difference	\$ 0 Included(1)	\$ 0 Excluded(2)	Difference
Expenditures									
Tuition	408	418	10	481	497	16	440	452	12
Other academic expenses	220	233	13	178	193	15	202	217	15
Food and accommodation	3,709	3,828	119	3,148	3,225	77	3,475	3,574	99
Other	2,045	2,181	136	1,659	1,681	22	1,880	1,961	81
Total	6,382	6,660	278	5,466	5,596	130	5,997	6,204	207
Income									
From federal government	1,035	4,139	3,104	1,505	3,827	2,322	1,225	3,969	2,744
From provincial government	306	2,134	1,828	256	1,956	1,700	289	2,061	1,772
From other sources	770	2,482	1,712	1,102	2,603	1,501	908	2,539	1,631
Nonrepayable cash contributions	110	1,023	913	96	730	634	105	876	771
Earnings from wages, salaries or self-employment while attending university	5,483	6,714	1,231	3,133	4,186	1,053	4,498	5,721	1,223
Earnings from wages, salaries or self-employment while not attending university	903	4,615	3,712	458	3,440	2,982	719	4,181	3,462
Others (e.g. investments or transfer payments)	292	1,111	819	165	533	368	243	863	620
Spouse's total income	3,005	7,833	4,828	2,482	6,957	4,475	2,790	7,519	4,729
From parents or other individuals	14	879	865	21	986	965	17	933	916
From university	4	741	737	10	1,991	1,981	7	1,231	1,224
From Canada Student Loan Plan	19	932	915	27	916	889	24	902	878
From provincial Student Loan Plan	39	1,056	917	45	1,023	978	41	1,040	999
Others	35	1,694	1,659	21	1,679	1,658	29	1,690	1,661
Other sources (not specified)	1	1,432	1,431	7	2,470	2,463	4	2,102	2,098

(1) Total money per item divided by all reporting doctoral students.

(2) Total money per item divided by only the number of students actually spending or receiving money for that item.

Source: Statistics Canada in co-operation with Secretary of State Department, Post-Secondary Student Survey 1974-75, unpublished data.

Table 9
Finances of Average Doctoral Students, by Field of Study, by Enrolment Status,
and by Marital Status, 1974-75 (\$; includes only students who received or spent money for the item specified)

Financial Item	Human Sciences					Natural Sciences				
	Single		Married		All Recipients	Single		Married		All Recipients
	Enrolled Full-Time	Enrolled Part-Time	Enrolled Full-Time	Enrolled Part-Time		Enrolled Full-Time	Enrolled Part-Time	Enrolled Full-Time	Enrolled Part-Time	
Expenditures										
Tuition	481	244	504	279	418	565	253	496	262	497
Other academic expenses	233	238	240	221	233	222	155	175	177	193
Food and accommodation	2,393	3,000	4,375	4,867	3,828	1,950	2,407	3,922	5,647	3,225
Other	1,213	2,136	2,306	3,250	2,181	1,058	1,912	2,001	2,956	1,681
Total	4,320	5,618	7,425	8,617	6,660	3,795	4,727	6,594	9,042	5,526
Income										
From federal government	4,070	3,511	4,319	3,493	4,139	3,695	2,634	4,042	2,598	3,827
From provincial government	2,235	1,580	2,251	1,566	2,134	1,335	2,417	2,474	1,362	1,956
From other sources	2,365	2,417	2,599	2,120	2,482	2,534	2,243	2,669	2,546	2,603
Nonrepayable cash contributions	1,051	1,842	784	1,452	1,023	693	176	818	1,335	730
Earnings from wages, salaries or self-employment while attending university	3,050	8,086	4,795	12,037	6,714	2,470	6,805	3,676	12,319	4,186
Earnings from wages, salaries or self-employment while not attending university	1,905	6,660	3,898	11,007	4,615	2,226	9,267	2,683	7,617	3,440
Others (e.g. investments or transfer payments)	761	692	1,175	1,447	1,111	441	356	641	444	533
Spouse's total income	3,902	9,500	7,511	8,817	7,833	2,074	11,474	6,975	6,914	6,951
From parents or other individuals	747	2,730	927	629	879	933	400	1,424	977	986
From university	727	602	738	867	741	400	0	925	0	1,991
From Canada Student Loan Plan	854	700	981	570	932	666	0	975	1,200	916
From provincial Student Loan Plan	845	1,705	979	691	1,056	971	0	1,147	0	1,023
Others	709	1,250	1,802	2,246	1,694	2,121	300	1,065	1,154	1,679
Other sources (not specified)	0	0	1,432	0	1,432	2,490	0	2,440	0	2,470

Source: Statistics Canada in co-operation with Secretary of State Department,
Post-Secondary Student Survey 1974-75, unpublished data.

Table 10

Canada Council Doctoral Fellowships, 1975-76

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Discipline and Field of Study	Number		Percentage		Success Rate	
	Applications (A)	Awards (B)	Applications	Awards	(B) as % of (A)	
Archaeology	31	14	1.0	1.1	45.2	
Classics	32	18	1.0	1.4	56.3	
History	326	125	1.1	9.4	38.3	
English	302	124	9.9	9.4	41.1	
French	118	49	3.9	3.7	41.5	
Other modern languages	197	75	6.4	5.7	38.1	
Linguistics	71	35	2.3	2.6	49.3	
Philosophy	186	86	6.1	6.5	46.2	
Religious studies	63	26	2.1	2.0	41.3	
Other	0	0	0.0	0.0	0.0	
Subtotal: Humanities	1,326	552	43.4	41.7	41.6	
Administrative studies	91	33	3.0	2.5	36.3	
Anthropology	117	60	3.8	4.5	51.3	
Communication studies	15	3	0.5	0.2	20.0	
Economics	186	79	6.1	6.0	42.4	
Education	333	152	10.9	11.5	45.6	
Geography	52	25	1.7	1.9	48.1	
Interdisciplinary studies	43	20	1.4	1.5	46.5	
Law	94	34	3.1	2.6	36.2	
Political science	251	108	8.2	8.2	43.0	
Psychology	352	173	11.5	13.1	49.1	
Social work	6	1	0.2	0.01	16.7	
Sociology	189	85	6.2	6.4	45.0	
Other	0	0	0.0	0.0	0.0	
Subtotal: Social Sciences	1,729	773	56.6	58.3	44.7	
Total: Human Sciences	3,055	1,325	100.0	100.0	43.4	

Source: Canada Council, unpublished data.

Table 11

Canada Council Doctoral Fellowships, Applications and Awards
Applicable to Canadian Universities, by Discipline and Field of Study, 1975-76

Discipline and Field of Study	Applications		Awards		Success Rate (%)
	Number	%	Number	%	
Archaeology	21	1.0	10	1.2	47.6
Classics	23	1.1	13	1.5	56.5
History	224	10.8	87	10.0	38.8
English	237	11.5	91	10.5	38.4
French	92	4.4	33	3.8	35.9
Other modern languages	158	7.6	59	6.8	37.3
Linguistics	35	1.7	16	1.8	45.7
Philosophy	107	5.2	42	4.8	39.3
Religious studies	42	2.0	17	2.0	40.5
Other	0	0.0	0	0.0	0.0
<u>Subtotal: Humanities</u>	<u>939</u>	<u>45.4</u>	<u>368</u>	<u>42.4</u>	<u>39.2</u>
Administrative studies	47	2.3	16	1.8	34.0
Anthropology	77	3.7	39	4.5	50.6
Communication studies	6	0.3	0	0.0	0.0
Economics	104	5.0	34	3.9	32.7
Education	255	12.3	112	12.9	43.9
Geography	39	1.9	19	2.2	48.7
Interdisciplinary studies	21	1.0	9	1.0	42.9
Law	28	1.4	8	0.9	28.6
Political science	143	6.9	59	6.8	41.3
Psychology	286	13.8	143	16.5	50.0
Social work	1	0.0	0	0.0	0.0
Sociology	122	5.9	61	7.0	0.0
Other	0	0.0	0	0.0	0.0
<u>Subtotal: Social Sciences</u>	<u>1,129</u>	<u>54.6</u>	<u>500</u>	<u>57.6</u>	<u>44.3</u>
<u>Total: Human Sciences</u>	<u>2,068</u>	<u>100.0</u>	<u>868</u>	<u>100.0</u>	<u>42.0</u>

Source: Canada Council, unpublished data.

federal and provincial loans were usually available, with liberal repayment provisions and low interest rates. Approximately one-third of all graduate students reported that they did not apply because they did not need the money, although another fifth considered themselves unqualified, did not know of the loan plans or were unwilling to take advantage of them. Forty per cent of the doctoral students did apply however, and most of them were successful. A higher proportion - 44 per cent - of the doctoral candidates in the humanities and social sciences applied for such loans. Most of the loans for these students fell between \$1,000 and \$2,000 in total.

These figures alone are not enough to draw any conclusions about the adequacy of financial support for doctoral students. Two borrowers out of every five doctoral students may seem a large proportion; the fact that few borrow more than \$2,000 may seem encouraging. But who can decide how many and how much graduate students should be expected to borrow? A comparison with doctoral candidates in the natural sciences - of whom only 34 per cent borrowed money - does suggest however that students in the human sciences have less opportunity to support themselves through scholarships or jobs.

Additional information about the income of full-time graduate students comes from a survey in Ontario for 1973-74. This study recorded the income of master's and doctoral students only from scholarships and academic employment. Very few students depended upon just one source; those with income from these sources tended to combine some fellowship income with some income from teaching; 22 per cent had no income, 32 per cent had income from one source only, and the remainder relied on two or more sources. Even more striking, 56 per cent depended on whole or in part on income earned from university teaching. Having a number of paymasters did not make these students rich. More than half had an income from these sources of \$2,400 or less and only 10 per cent had incomes exceeding \$4,800. The survey clearly underlines the importance of university teaching funds as a source of graduate student income.

4. Student Attitudes

It is more difficult to ascertain and assess student attitudes. These attitudes, however, may have more influence on the future of graduate studies in

Canada than the choice of universities or actual income. Our own impressions are qualified and imprecise but, tentative as they are, they clearly have a bearing on our view of graduate studies in Canada.

No detailed research was needed to realize that the status and outlook of undergraduate students has undergone a revolution in recent years. Only two decades ago university administrations exercised a broad range of authority over all undergraduates. Undergraduate programs were largely determined by faculties or departments; students might have some "electives" but in many cases the choice of the major subject was also a commitment to a large number of prescribed courses. Even the nonacademic activities of students were regulated. University residences might have house committees, but university authorities established most of the rules; students published newspapers, but student editors might be reprimanded or dismissed if they went beyond the administration's norms of responsibility or good taste. Students might complain about actual interventions, but few questioned the university's right to intervene. In statu pupillari meant that the officers of the university were in loco parentis.

The Latin terms, dating back to the mediaeval university, suggest how long students had been seen as subject to the university authority. And yet today in Canada that pattern is gone and all but forgotten. In residences, students have a status similar to that of tenants. The regulations governing life in residence and their enforcement are usually the responsibility of students themselves and university authorities, implicitly, have conceded that the private life of students is not their concern. It is now common for students to have representation on senates and boards of governors and at the departmental level on curriculum committees and committees on appointment, tenure and promotion. The very wide range of electives and options is another indication that universities treat students as adults and give them a full measure of responsibility for their own education. Their place in the government of the university is still ambivalent and contested - are they consumers, clients or a social class? There is still no consensus among students, faculty or in society at large. But one thing is clear: universities no longer treat students as minors. They do not make all their academic decisions for them, and they do not supervise their private lives.⁵

Two decades ago, graduate students were probably treated with greater respect than undergraduates. Most of them, after all, had high academic credentials and aspired to university posts after graduation. Officially the university still established the program of study, although again the doctoral students would be consulted on the details. If they chose to live in residence or to work for the student newspaper, however, their status differed little from that of an undergraduate. Today graduate students are more likely to have official representation at the departmental and faculty level and, at the extracurricular level, they are as independent of university authority as undergraduates. For them the shift over the last two decades has been less dramatic, but the same trend toward increased individual responsibility is unmistakable.

It also seems clear that the battles of the 1960s are over and that students today are focusing on different issues. In that decade one of the issues had been the role and the status of students within the university. The confrontations and even the student strikes had been over the right to participate at various levels of university government and to exercise some influence over professors and courses. It is not certain that the students won these battles; some would argue that the concessions they received are little more than tokenism. It is more certain that the students of today no longer show much interest in these issues. In most institutions there appears to be almost no competition to be the student representative at the departmental or university level, and it is not unheard of for faculty to urge students to seek the nomination. It is clear that there is no widespread campaign for reforms which would go beyond the changes of the last decade.

What then are the issues which concern the students of today? There is no consensus, either among students or observers. Our Student Opinion Survey, however, does suggest that graduate students are more concerned with their own programs than with university government. Some students involved in the project objected to the constraints of program requirements and pleaded for a greater opportunity to relate their course work to their research. There did seem to be a fairly widespread conviction that thesis supervisors were too preoccupied with their own research to give adequate attention to their graduate students. There were also scattered complaints about inadequate

office space and inadequate accommodation for graduate students; as a separate category of students on campus, they wanted to have these facilities. It is not easy to assess the intensity of such grievances or to compare their attitudes on these topics with those of graduate students of another era. We can conclude, however, that graduate students of today tend to react as individuals and are not dominated by any overriding resentment of their status as a group. It is surely not irrelevant that we encountered more concern about the employment situation for PhDs than for the treatment of native populations or the social domination of corporate interests.

There was one area of concern which, although it is consistent with this individual focus, was so often referred to that it should not be overlooked. The graduate students associated with the project were far from satisfied with their financial situation. They felt that most of the scholarships and bursaries fell short of their financial needs and they were obliged to supplement their income in various ways, and so sacrifice some of the time which they could have given to their studies or their research. They were especially critical of the teaching positions offered by universities. They considered themselves overworked and underpaid. There was a sense of being exploited by the university or by members of the faculty. Part-time work outside of the university did not seem to be considered a preferred alternative; the ideal appeared to be more generous scholarships or bursaries, and the next best solution would be university teaching or research posts which paid wages commensurate with their qualifications. It is this sentiment presumably which has led teaching assistants at some universities to form unions to negotiate for higher pay.

For many graduate students, problems relating to finances and programs do not loom as large as job prospects after graduation. In the Post-Secondary Student Survey, doctoral candidates frequently stressed personal development as an objective of graduate training but they also showed an unmistakable concern for career opportunities. It is a concern which probably becomes more acute as the day of graduation approaches. Graduate training, especially to the level of a doctorate, is a major investment of time and of deferred income, and it is an exceptional student who does not hope to find a career which will provide financial benefits as well as other forms of personal

satisfaction.

One of the major changes in recent years has been the contraction of openings in the sectors where doctoral students have traditionally been employed. Universities stress the PhD as the preferred qualification for their faculty and have always absorbed a large proportion of doctoral graduates. The expansion of postsecondary education accentuated this pattern. Thus in Ontario, for the period 1964-1969, the first job of 48 per cent of the PhDs graduating in Canada was university teaching. Over the next few years this percentage declined steadily until it was down to 34 per cent in 1973-74. The figures for Canada from 1970-71 to 1973-74 showed the same pattern, declining from 40 to 33 per cent. Within this category of Canadian PhDs, 69 per cent of the graduates in the social sciences found first employment as university teachers in 1970-71, and 50 per cent in 1973-74. The concentration of PhDs in the humanities in university teaching is even more marked; in 1970-71, 83 per cent of the PhDs graduating from Canadian universities went into university teaching, and in 1973-74 the figure was still 65 per cent.⁶

Demographic projections suggest that over the next few years fewer and fewer PhD graduates will find positions on university faculties. The number of Canadians between the ages of 18 and 24 will remain steady and then will actually decline until the 1990s, when there will be an upswing. If rates of university attendance for this age-group remain constant there will be few new university posts created and not even all the retiring faculty will need to be replaced. Until the 1990s the university openings for new PhD graduates are likely to continue to decline.

Past experience holds out little hope that governments or industry will take up much of the slack. In the years from 1970-71 to 1973-74 government hiring of new PhDs in Canada did rise from 9 per cent to 12 per cent. For the social sciences the equivalent percentages were 9 per cent and 14 per cent respectively; for the humanities, 2 per cent and 5 per cent. Employment of PhD graduates in industry was almost constant during these years, ranging between 9 per cent and 10 per cent; for graduates in the social sciences, it never exceeded 5 per cent, and in the humanities for most years there were no openings whatsoever.⁷ Unless the pattern changes dramatically over the next few years, governments and private enterprise will not significantly

increase their intake of new PhDs in the social sciences or the humanities.

Graduate students are certainly aware of the reduced employment opportunities. Applications for Canada Council doctoral fellowships have declined in recent years, admissions to doctoral programs in the social sciences have leveled off and admissions in the humanities have actually declined. It seems probable that only a few years ago most of the students entering doctoral programs in the humanities and social sciences had university teaching as their goal.⁸ A survey of doctoral students in the human sciences in 1975, however, showed that only 48 per cent expected to become university teachers.⁹ Even this may be optimistic, given the high levels of enrolment, but it does show that the expectations of graduate students have been affected by the decline in university openings.

What conclusions can we draw from this for a report on the aims and objectives of graduate studies in Canada? The increasing tendency of Canadian graduate students to attend Canadian universities may be a vote of confidence in Canadian graduate programs; it can also be interpreted as imposing greater responsibility on graduate faculties. The financial concerns of the students certainly cannot be ignored. But are they strictly monetary problems, to be resolved by larger scholarships and higher wages? Or are they symptomatic? Could it be that too many students are competing for the available funds? Is the talk of financial insecurity a reaction to the insecurity of students in a society in which the demand for their skills has declined? It is at least encouraging to note that some of the student concern is focused on the academic program, on the correlation between courses and research and on the relations between student and supervisor. Any proposed changes in these areas which would improve graduate training would presumably meet some of their needs and would assuredly meet with their approval.

Notes

1. This rapid expansion of graduate studies in Canada contrasts with the U.S. experience, where graduate studies were more developed at the beginning of the period and so the rate of expansion was less vertiginous. PhD enrolment in the United States at the beginning of the decade, for example, was about 10,000; by the end of the decade it was about 30,000.
2. For this survey, a questionnaire was distributed by mail to a stratified sample of students enrolled in credit courses at universities and community colleges in Canada. The entire doctoral student population was included in the survey. The return from the doctoral students was approximately 60%. We are grateful to Statistics Canada and to the Secretary of State Department for their cooperation during the planning and analysis of this survey and for making it possible for us to obtain information which could not have been obtained any other way.
More information on the background and details of the survey can be found in Secretary of State, Some Characteristics of Post-Secondary Students in Canada (Ottawa: 1976).
3. The students were usually chosen by the president of the Graduate Student Council. There was a total of sixty-two students in the groups at the Universities of New Brunswick, McGill, Trent, Alberta, Simon Fraser, Victoria (B.C.) and the Ontario Institute for Studies in Education, and seventeen students in all from the University of Montreal and Laval University. For each of the two groups of universities an animateur produced a report based on the discussions and on written questionnaires completed by the participants.
4. See, for example, Tables 31 and 33 in the mimeographed study prepared for Department of the Secretary of State, May 2, 1975, by Max von Zur-Muehlen, "Canadian Students Abroad and Foreign Students in Canada", which list the full-time and part-time students by country of birth and field of study. Some of the foreign born students will have acquired Canadian citizenship, but the data nonetheless amply support this conclusion.
5. See Murray G. Ross, The University: The Anatomy of Academe (New York; Toronto: McGraw-Hill, 1976), for a stimulating discussion of this transition.
6. Council of Ontario Universities, Employment of New PhD Graduates, compiled by M.A. Preston, October 1974.
7. Ibid.
8. See for example, a survey of graduating PhDs conducted by the University of Toronto Task Force in 1974, and described in Appendix F of its report.
9. Statistics Canada, in cooperation with the Secretary of State Department, Post-Secondary Student Survey, 1974-75, unpublished data.

III UNIVERSITY PROFESSORS

For university teachers, as for graduate students, the dramatic changes since the early 1960s are closely associated with the phenomenal expansion. In 1960-61 there were 6,000 full-time faculty members at Canadian universities; in 1965-66 there were 12,000; in 1970-71 there were 24,000; in 1974-75 there were 30,000.¹ Canadian universities had never before experienced such rapid growth and probably never will again. We are only now beginning to assess the impact and the consequences of this transformation.

1. Changes in Profile of University Teachers

The five-fold increase in the number of full-time university professors since 1960 has meant more than a simple multiplication of the faculty at that time. A profile of the present faculty shows the effects of shifting demands among the disciplines as well as the effects of the intense demand for qualified teachers in almost all fields.

There were, for example, 2,500 professors in the humanities and social sciences in 1960-61, out of a total of 6,000 in all. By 1974-75 there were over 15,000 out of a total of 30,000, a six-fold increase compared with a four-fold increase in the natural sciences. Within the human sciences the social science faculty grew more rapidly than the humanities. The most obvious explanation for this shift is the pattern of student enrolment, where the preference for the human sciences and especially for the social sciences created a greater demand. In the 1970s, however, the distribution by fields seems to have stabilized. The rate of faculty growth has declined but the relative distribution between the humanities, the social sciences and the natural sciences has remained almost unchanged.² It seems probable that the present balance will be maintained and that the faculty in the human sciences will continue to constitute slightly more than half of the university faculty in Canada over the next few years.

There are some minor regional differences concealed by these country-wide statistics. The faculty, for example, expanded in every region between 1971-72 and 1974-75 but in the Western region the rate of growth was only 6 per cent compared to 16 per cent for the Maritimes, with Quebec and Ontario

showing a 12 per cent and a 14 per cent increase respectively. There were also minor differences in the respective distribution within the human sciences. The ratio of humanities professors to the total faculty declined slightly in every region with the exception of Ontario, where there was a slight gain. The social sciences improved their relative position slightly in most regions and more markedly in Ontario.³ These differences, however significant they may be for regional planners, are only minor variations within the overall Canadian pattern.

Probably the most marked effect of the faculty expansion, and the most significant, is the relative youth of Canadian university professors. In 1956-57 the mean age of the full-time university professors was 41.4, with 21.4 per cent between 50 and 64 years of age. By 1968-69, after the period of most rapid expansion, the mean age of the faculty had declined to 38.9; just 14.4 per cent of the total faculty were between the ages of 50 and 64. Since that time the rate of expansion has declined, and by 1975-76 the mean age of the faculty had risen to 41.1. Even so, it is noteworthy that 53.6 per cent of the faculty fell within the 35 to 49 age-group and only 18.7 per cent in the 50 to 64 age-group.⁴

This age distribution has many implications. It is obvious, for example, that there will be very few vacancies created by retirement over the next 15 years. Moreover, in this period the age-group between 18 and 24, which in the past has provided four-fifths of the full-time students, will remain relatively stable until 1982 and will then decline. If there is no significant change in the proportion of this age-group attending university and if there is no significant change in the staff-student ratio at universities, the number of professors at Canadian universities will increase until the early 1980s and will then decline steadily for the next decade.⁵ With few retirements and an actual decline in the number of faculty positions, the prospect for the 1980s is a period when there will be almost no additions. What emerges is the loss to the academic world of almost an entire generation of bright young scholars, while university teaching and research become the monopoly of an aging and increasingly conservative faculty.

The projections of student enrolments and faculty retirements also draw attention to possible difficulties in the 1990s. In this decade the 18 to 25

age-group will increase, and so higher enrolments are likely. At the same time the number of faculty retirements will rise. The net result will be a sharp increase in the demand for qualified professors.⁶ The significance of this demographic pattern will be painfully obvious to those who experienced the university expansion of the 1960s. A decline in the number of university positions in the 1980s is likely to lead to a decline in the enrolment in PhD programs, especially in the humanities and social sciences. The upswing in demand in the 1990s could therefore come at a time when Canadian graduate programs cannot supply this demand. If we are to be prepared for expansion in the 1990s the potential professors will have to be admitted to doctoral programs in the mid-1980s.

Projections based on population patterns are far from reliable. The total number of faculty at any time in the future is also affected, for example, by any changes in the student/faculty ratio at Canadian universities. In the years of expansion, faculty appointments more than kept pace with student enrolments and the student/faculty ratio actually dropped from 18.3 in 1965-66 to 16.8 in 1975-76.⁷ The temptation to meet the expansion by increasing the student/faculty ratio seems to have been countered by efforts to ensure that teaching did not absorb all of the professors' time in order to leave them time for research, and possibly because some of the expansion was at the graduate level where closer contact between student and faculty is needed. It would be unrealistic to count on a lowering of the student/faculty ratio over the next few years to make more new appointments possible.

The sudden expansion of Canadian universities has already provoked widespread controversy over the issue of citizenship. Increased student enrolment obliged universities to hire more professors at a time when Canadian graduate schools, especially in the humanities and social sciences, were still undeveloped. Almost inevitably, universities looked abroad to foreign university faculties or graduate schools for recruits. There were hostile reactions to the hiring of foreign teachers, however, especially those from the United States. It was argued that these professors brought with them a cultural baggage which threatened to swamp the Canadian features of Canadian universities. The intensity of the reaction was heightened in some cases by animosity to the United States and fears of "American imperialism" at a time

when Vietnam and then Watergate colored attitudes towards Americans.

The so-called invasion of American professors may well have been exaggerated. At the time, almost nothing was known of the origin or citizenship of Canadian university professors and rumours were sometimes accepted as facts. It is now estimated that of the 26,000 new appointments between 1962-63 and 1975-76, 60 per cent went to Canadian citizens. Even the remaining 40 per cent could not all be considered culturally alien. There are no exact figures, but a number in this group had been admitted to Canada as landed immigrants to study in Canadian graduate schools and had subsequently become professors. A recent study concludes that possibly 25 per cent of the new university teachers could be classified as immigrants who came directly to teach at Canadian universities. Of this group, probably less than half came from the United States.⁸

The total number of foreign professors, however, may be less significant than what or where they teach. The cultural influence of a teacher in the humanities or social sciences, for example, is likely to be greater than for a professor in the natural sciences because his selection and presentation of material are more influenced by his own cultural bias. Data on the citizenship of full-time faculty in 1974-75 show that two-thirds of the faculty were Canadian citizens and that in the humanities and social sciences 63.5 per cent were Canadian citizens.⁹ The proportion with Canadian citizenship is less in some disciplines within the humanities and social sciences. Probably more significant is the variation among universities. Rapid expansion at some institutions may have led to a situation where Canadian citizens are a minority in some departments.

There is little danger now that Canadian universities will be swamped by foreign appointments. One result of the controversy over foreign professors was that hiring procedures were modified to ensure that any eligible Canadian candidate was at least identified and considered. It may also be relevant that Canadian graduate schools are now training a much larger number of potential professors in a wider range of disciplines. At any rate it is estimated that over the last four years close to 80 per cent of Canadian university appointments have gone to Canadian citizens and landed immigrants of long standing.¹⁰ Even more significant, however, is the sharp decline in the total number of appointments. With the probability of only some 400 to

500 appointments a year, the cultural climate of Canadian universities is not likely to be greatly affected even if many of them come from abroad.

Even if the problem is not going to get worse, however, the issue of Canadian cultural identity within university departments or faculties may still be a matter of some concern. We have not made a special study of this topic because it has already been the subject of a detailed investigation by T.H.B. Symons. The first section of his report, To Know Ourselves, deals with Canadian content in university programs and courses and the second section, not yet published when this report was written, is expected to deal with the cultural implications of faculty origins.

The prospect of an aging faculty with few retirements and few new appointments has other implications which can be noted briefly. The distribution of faculty by rank has changed markedly. In 1960-61, some 21 per cent of full-time university teachers held the rank of Lecturer, Instructor or the equivalent. With the increased demand for teachers, immediate appointment to the rank of Assistant Professor became more common and the proportion of non-professorial appointments fell to about 13 per cent.

Table 1

Percentage of Teachers in the Professorial Ranks
(Professor, Associate Professor, Assistant Professor)

	1960-61	1973-74
All fields	79%	87%
Human sciences	73	85
Natural sciences	84	91

Source: Statistics Canada, unpublished data.

Within the professorial ranks, Canadian university teachers still show the effects of the period of unprecedented growth. In 1973-74, 33 per cent were Assistant Professors and 22 per cent full Professors, compared to the university faculty in the United States where the distribution in 1972-73 was

24 and 36 per cent respectively.¹¹ The difference is largely accounted for by the difference in age distribution; it is not surprising that there is a higher proportion of full Professors in the United States, when the proportion of university teachers in the United States over the age of 51 is more than double that in Canada. It is also obvious that if the size of the university faculty remains constant over the next decade, the faculty at Canadian universities will not only age but will also be promoted. The time might even come when full Professors outnumber all the other ranks.

This distribution by rank has a significance beyond issues of status and prestige. Full professors earn higher salaries than assistant or associate professors. An aging faculty therefore holds out the prospect of higher salary costs without any increase in faculty numbers. Since full- and part-time faculty salaries already constitute almost two-thirds of university operating expenditures for instruction and nonsponsored research, the aging of faculty will have a significant impact on university budgets.¹²

A relatively stable faculty over the next few years could also inhibit attempts to respond to new social attitudes. For example, the present university teaching community in Canada is dominated by male teachers. In 1973-74 only 13 per cent of full-time university teachers were women. Within the professorial ranks these women were concentrated in the lower ranks of Lecturer and Assistant Professor; only 4 per cent of full Professors were female. It is also true that relatively fewer women earn a doctorate - in 1972-73 only 11 per cent of those graduating with a PhD were women - and even among full-time faculty just over one-third of the women had a doctoral degree, whereas more than three-fifths of the men held the doctoral degree. It is possible to envisage measures to increase the proportion of women in doctoral programs, to upgrade the qualifications of women teaching at universities and, by discrimination in favour of women for appointments and promotions, to redress the balance. If there are to be only a few new university appointments over the next decade, however, women are fated to remain a small minority on university faculties.

This profile of Canadian professors, however, would be misleading if it did not also draw attention to one of the most positive developments of the past few years. In 1963-64, 43 per cent of faculty had a PhD or the equivalent.

By 1974-75, after the prolonged period of recruiting new staff, the academic qualifications were actually higher, with 57 per cent of faculty holding a doctoral degree. The improvement was most striking in the province of Quebec, where the proportion rose from 34 to 55 per cent.

Table 2

Percentage of Full-Time University Teachers with Doctoral Degrees,
by Region, 1963-64 and 1974-75

	1963-64	1974-75
Atlantic region	33%	46%
Quebec	34	55
Ontario	50	59
Western region	47	62
Canada	43	57

Source: Statistics Canada, unpublished data.

A further breakdown shows that 62 per cent of the faculty in the natural sciences hold a doctoral degree, compared to 56 per cent in the humanities and 52 per cent in the social sciences.¹³

2. The Attitudes of Professors

These statistics, however, provide only a partial description of the evolution of the faculty at Canadian universities over the past 10 or 15 years and offer only varying degrees of probability for the future. The attitudes of professors, like the attitudes of students, are not included in these statistics but they will also have a significant impact on future developments in graduate studies. Attitudes are notoriously elusive and changeable, but again some broad generalizations may help to explain the context in which graduate studies will develop over the next 10 or 15 years.

We have already noted the change in the status of students within the university, although we also mentioned the possibility that the actual

changes may not have gone much beyond a token recognition of the students' right to participate in university government. The status of professors also changed in these years. The shortage of qualified university teachers, combined with the prestige of university education, led to a sharp increase in salaries and other benefits, such as improved office accommodation, more secretarial assistance, more generous research funds and a reduction in teaching loads. Professors acquired an importance they had not had before and this was reflected in their greater influence in university affairs. In many university departments, an appointed head of department gave way to a chairman with a limited term elected by members of the department. Deans and even presidents were often selected by search committees on which professors were a majority. Professors were even to be found on boards of governors. Indeed, a comparison between the increased influence of students and of faculty in the government of Canadian universities would probably show that the major gains went to the members of faculty.¹⁴

Will these gains be retained now that enrolment is leveling off and the supply of qualified teachers may sometimes exceed the demand? University professors have certainly been arguing that their salaries have not kept pace with salaries in other fields, and that the other benefits they have acquired are precarious. In some institutions faculty have responded to this feeling of insecurity by forming trade unions and bargaining collectively over salaries and conditions of employment. It is too early to speak with any assurance about the long-range effects of these unions, but it is likely that they will protect the interests of the present faculty. Desirable or even necessary as this may be, one of the probable consequences is that appointments and tenure procedures will become more precisely defined and hence more inflexible. Protecting the interests of the present faculty members may make it more difficult to appoint new members or to modify existing regulations to adjust to shifts in student enrolment or changes in university personnel policies.

The era of expansion was also a period when the research role of professors acquired greater prestige. Ambitious university administrators encouraged the expansion of graduate studies and were willing to offer more money and fewer teaching duties to professors whose scholarly reputation could attract graduate students. Within the university, salaries and promotions also

reflected this priority for research; the rewards went to professors who published, and relatively little attention was paid to assessments of their work as teachers. Libraries and laboratories received more generous budgets. Teaching loads were reduced, with some of the teaching being shifted to teaching assistants and part-time faculty. Research, which had often been seen as an adjunct to teaching, was more likely to be treated as a legitimate activity in its own right and a direct contribution to the reputation of the university.

What will be the impact on the research activities of faculty now that the era of rapid expansion has ended? There are at least some indications that there will be a renewed emphasis on the teaching role of the professor, and that competent teaching will become a more important factor in awarding promotions or salary increases. Library budgets have already suffered from budgetary constraints. It may be that universities will rely less on teaching assistants and that professors' teaching posts will increase. If there is such a trend, and if the research activities of faculty are thereby curbed or curtailed, the significance for graduate studies will be far-reaching.

It also seems probable that there will be a greater concern for assessing the results of professors' efforts. At the graduate level, for example, a professor's claim for promotion or salary increase rests at least in part on the number of graduate seminars he has taught and the number of theses he has supervised or is supervising. It seems likely, however, that a more rigorous assessment of a professor's teaching and his research supervision is required. The number of doctoral candidates a professor has supervised is less revealing, for example, than the number of theses completed, the average time required for the completion of these theses and how these theses were rated within the discipline. The assessment of a professor's research is also likely to become more rigorous. The number of publications in refereed journals is indicative, but more refined assessments of the contribution to knowledge are needed.

The future pattern, however, will depend upon much more than the interests or influence of faculty. The trends and tendencies relating to students and faculty must be seen in the broader context of graduate teaching and research before we can discuss what is likely to happen or what we believe should happen.

Notes

1. See Table 1: "Full-time university teachers by field, Canada, 1960-61 to 1974-75, selected years". In the United States the faculty grew from 281,000 in 1963 to 518,000 in 1975, a rate of expansion well below the Canadian rate for the same period.
2. See Tables 2 and 3.
3. Table 5: "Number of full-time university teachers by field, by region, Canada, 1971-72 to 1974-75."
4. See Table: "Age Distribution of Full-time University Teachers, Selected Years in Percent", from Max von Zur-Muehlen, Statistics Canada, "The New 'Crisis' of Canadian Universities", Third Draft, mimeographed, Jan. 4, 1977, Table 2, page 9.
5. It has been estimated that retirement and mortality will provide an average of only 358 openings per year over the next five years. Max von Zur-Muehlen, *ibid.*, Table 3, p. 10.
6. See Chart: "Projected number of full-time university appointments", based on ratio of population of age-group 20-29 to the average number of full-time university teachers from 1971-72 to 1974-75.
7. See Max von Zur-Muehlen, "The Age Structure of University Professors by Province and Discipline", Statistics Canada, April 15, 1977, Table 37.
8. These paragraphs are based on Max von Zur-Muehlen, "The Issue of Foreign University Teachers at Canadian Universities", Statistics Canada, Second Draft, mimeographed, May 1, 1977.
9. Table 20: "Citizenship of Full-Time Staff by Field, 1974-75".
10. Max von Zur-Muehlen, *ibid.* p. 52.
11. Max Von Zur-Muehlen, "Profile of University Teachers in the Mid-Seventies", Statistics Canada, mimeographed, June 25, 1976.
12. Statistics Canada, "Financial Statistics of Universities and Colleges 1974-75, Part II", Report 6B.
13. See Tables 18 and 19. The lower figure for the Social Sciences may be attributed to the career-oriented disciplines, such as education, library science, journalism, administrative studies and social work, for which the master's degree is often terminal. In 1972-73, 49.6 per cent of university teachers in the United States had an earned doctorate: Max Von Zur-Muehlen, "Profile of University Teachers in the Mid-Seventies", Statistics Canada, mimeographed, June 25, 1976, Table 10.

14. See Murray G. Ross, The University: The Anatomy of Academe (New York; Toronto: McGraw-Hill, 1976) for a discussion of this evolution in Canada, England and the United States.

IV QUANTITATIVE GROWTH OF GRADUATE STUDIES

In the two preceding chapters, we have presented data on the quantitative growth of graduate studies as these pertain to students and teachers. The second section will bear on university research. In order to assess the quality of these studies accurately it is necessary to examine certain quantitative points. An adequate assessment of the quality would not be possible if we neglected to relate it to the overall development of universities and their operating expenditures, the growth of undergraduate studies, the number of students and teachers, the degrees awarded and the number of graduates, the length of studies, regional conditions and some international comparisons. Such is the purpose of this chapter.

1. Expenditures of Graduate Studies

During the past 15 years, the money paid to universities (excluding incomes from ancillary enterprises) experienced a staggering increase of 752.5 per cent, rising from \$210,606,000 in 1961-62 to \$1,795,333,000 in 1974-75, an annual growth rate of 17.9 per cent. In 1971-72, approximately 77 per cent of this money came from government sources, while this percentage was only 58 ten years earlier. Conversely, the portion of tuition fees declined from 27 to 14 per cent during the same period. The method of calculating university expenditures does not distinguish the portion allocated to graduate studies; moreover, it is impossible to make approximate estimates or determine fluctuations over time. The sums allocated to research cannot be entirely imputed to graduate studies, even if research is most closely connected with the latter. We will present, therefore, some data on these sums.

The portion of money assigned to pure research in universities gives some idea of the relative extent of graduate studies. Canada performs well on this count among OECD countries. In the late 1960s Canada's performance in the field of higher education relative to fundamental research was relatively good compared to that of other industrially developed countries in the OECD. In 1969, Canada's expenditures for higher education amounted to almost 63 per cent of the total fundamental research expenditure. This was higher than that in the United States and close to the percentages shown by France and

Japan. However it was considerably below the 87 per cent recorded by Sweden. Canada's performance was also creditable when higher education expenditures were compared with total expenditures for fundamental and applied research; Canada placed higher than the United States and France but still considerably behind the leader, Norway (Appendix III, 5).

The portion of money allocated to research in the overall operating budgets of universities provides another indication of the relative importance of graduate studies expenditures. This portion comes to about 12 per cent and has hardly varied from 1961-62 to 1973-74, except in 1966-67 when it was 14 per cent (Table 1).

The sums allotted to university research have increased by more than 700 per cent from 1961-62 to 1974-75, rising from \$26,539,000 to \$215,596,000. Since the number of career teachers increased by more than 319 per cent in the same period, the sums available to teachers for research increased by only 93.9 per cent. In 1961 constant dollars, there was a relative decrease of \$303 per teacher over these years and a steady decline from 1967-68 to 1974-75. The decline in 1961 constant dollars is \$1,493 or 30.5 per cent (Table 2).

All things considered, the federal government allocates much less money to research and development in the human sciences than in the natural sciences (\$22,600,000 against \$143,780,000 in 1974-75, or under 15%). The sums allotted to teachers are also unequally distributed (\$22,600,000 for 16,710 teachers, namely \$1,352 per human science teacher against \$143,780,000 for 12,563 teachers, namely \$11,445 per natural science teacher; each human science teacher received about 11.8 per cent of the research money of his natural science counterpart).¹

In order to accurately assess the relative importance of graduate studies expenditures and their distribution by sector, it would be necessary to determine the portion of capital investments allotted to these studies, the capital invested in research laboratories and libraries, indirect research expenditures and the working-time cost of teachers in graduate teaching and research. The available data do not allow such an assessment. These expenditures were unquestionably very high, at least in universities providing numerous graduate programs.

The gains made by Canadian universities in this area in the 60s were

Table 1

Sums Allocated to University Research Compared with
the Operating Budget in Absolute Figures and Percentages,
for Selected Years, 1961-62 to 1974-75

Year	Assisted Research Expenditures \$000 (1)	Total Operating Expenditures \$000 (2)	(1) as % of (2)
1961-62	26,539	211,330	12.6
1966-67	82,639	579,215	14.3
1971-72	168,028	1,377,727	12.2
1972-73	178,094	1,433,712	12.4
1973-74	195,312	1,580,956	12.4
1974-75	215,596	1,836,517	11.7
Constant annual growth rate, 1961-62 to 1974-75	17.5%	18.1%	

Source: Statistics Canada, Canadian Universities, Income and Expenditures (Cat. No. 81-212) (Ottawa: Information Canada).

Table 2

Assisted Research Expenditures per Full-time University Teacher,
in Current and Constant Dollars, Canada, 1961-62 to 1974-75

Year	Number of Full-time University Teachers	Assisted Research Expenditures by Universities, \$000 current	Assisted Research Expenditures per Full-time University Teacher, \$ current	Assisted Research Expenditures by Universities, \$000 1961 constant*	Assisted Research Expenditures per Full-time University Teacher, \$ 1961 constant
1961-62	7,172	26,539	3,700	26,539	3,700
1962-63	7,890	30,738	3,896	30,018	3,805
1963-64	9,125	36,796	4,032	34,518	3,783
1964-65	10,605	47,613	4,490	43,167	4,070
1965-66	12,085	61,580	5,096	53,408	4,419
1966-67	14,394	82,639	5,741	67,132	4,664
1967-68	16,703	107,413	6,431	81,683	4,890
1968-69	18,864	127,398	6,753	91,653	4,859
1969-70	21,839	143,074	6,551	95,066	4,363
1970-71	24,604	151,894	6,174	95,351	3,875
1971-72	26,963	168,028	6,232	99,366	3,685
1972-73	27,735	178,094	6,421	98,941	3,567
1973-74	28,410	195,312	6,875	101,198	3,562
1974-75	30,046	215,596	7,176	102,081	3,397

* Calculated by using the deflator for government expenditures on goods and services.

Sources: Financial data from Statistics Canada, Canadian Universities, Income and Expenditures (Cat. No. 81-212) (Ottawa: Information Canada); faculty data from Statistics Canada.

substantial in both domestic and international terms. Since the late 1960s, erosion in real financial terms has occurred. This erosion is not unique to Canada as many of the same forces operating here were also at work abroad (e.g., in the United States). Some of these forces included high monetary inflation; disillusion with the benefits of higher education, and science, in general; lower enrolments (particularly important for universities whose level of government funding was directly related to enrolment); and other pressing claims on the public purse - from health care and social welfare, for example.

2. Graduate Students Enrolment

In 1940-41, Canada had 36,454 full-time students: 34,699 at the undergraduate level and 1,755 in graduate studies. In 1950-51, of a total of 63,430, 59,160 were at the undergraduate level and 4,270 in graduate studies. In 1960-61, of 113,864, there were 107,346 at the undergraduate level and 6,518 in graduate studies. The proportion of graduate students has varied little over these 30 years: 5 per cent in 1940-41, 7 per cent in 1950-51 and 6 per cent in 1960-61. But, in the 60s, this situation changed. By 1970-71, it had risen to more than 9 per cent, with undergraduate students reaching 323,564 and graduate students 30,815 of a total enrolment of 354,379. In 1974-75, of a total of 414,448 full-time students, 31,498 were enrolled in graduate studies and the percentage distribution had declined to 7.6 per cent.²

In 1967-68, 66.8 per cent of all full-time undergraduate students and 54.1 per cent of full-time graduate students were studying the human sciences. By 1974-75, 56.8 per cent of undergraduates and 62.8 per cent of graduate students were clearly identified as being enrolled in the human sciences.³ In both cases, the majority of students were enrolled in the human sciences, and their proportion rose rapidly at the graduate level.

In 1960-61, there were 6,518 full-time graduate students. In 1974-75, there were 31,296: 21,925 at the master's level and 9,371 in doctoral studies. Approximately two-thirds of the full-time enrolment at the master's level during the 1970s has been in the human sciences; at the doctoral level, there has also been an increase in the proportion of human science to total full-time enrolment, from 44 per cent in 1970-71 to 54 per cent in 1974-75

(Appendix III, 7.1 and 7.2).

The number of part-time graduate students has increased greatly since 1960. In 1961-62, there were 5,150 against 7,668 full-time, and in 1974-75, there were respectively 20,970 and 31,296 - percentage increases of 407.2 and 408.1. A high percentage of these part-time students, particularly those at the doctoral level, write their thesis while already engaged in an occupation, but others, whose numbers are probably growing, complete their studies including course work while working on a full- or part-time basis (Appendix III, 7, 8 and 8.1).

The number of graduate students has been constantly increasing in all regions since 1940. Quebec's proportion of students, however, has decreased by nearly 8 per cent during this period (going from 34.4 to 26.3%), while every other region in the country has risen a few points (Appendix III, 9).

Taken individually, universities display very different patterns. The enrolment patterns over the five years covered in the undergraduate enrolment data and over the six years in the graduate data reveal that each university has a different pattern from year to year. Not only may the trends be contrary but also the magnitude of the changes may differ markedly. This is true even for universities in the same geographical locality; compare, for instance, Western Ontario, Waterloo, Sir Wilfrid Laurier and McMaster (Appendix III, 10, 10.1, 10.2 and 10.3).

Great disparities in the size of enrolments exist among the universities. At the undergraduate level, Nova Scotia Technical College or Bishop's University are dwarfs compared with the University of Toronto or the University of British Columbia. The same situation prevails at the graduate level, where in 1975-76 the University of Toronto had several hundred times more students than did St. Francis Xavier or Trent.

At the graduate level there has not been much change in the rank of universities according to the size of their full-time enrolment between 1970-71 and 1975-76. The rank coefficient for the 26 largest universities for these two years was 0.94 (excluding Sherbrooke and Moncton) (Appendix III, 10.4).

Great differences exist between universities in the ratio of full-time undergraduate to full-time graduate enrolments. In 1973-74, universities such as McGill, Montreal and Toronto had ratios of approximately five undergraduates

per graduate student, while institutions such as St. Francis Xavier, Bishop's, and St. Mary's had ratios of over 100 and Trent of over 200 to 1. It is not to be assumed either that the universities which have large total enrolments have small undergraduate to graduate ratios; the case of Simon Fraser disproves this. These ratios clearly show which universities are primarily oriented to undergraduate studies, which have strong graduate commitments and which are straddling the fence between undergraduate and graduate orientations (Appendix III, 10.5).

The full-time student/faculty ratio has gone down considerably since the early 1960s. In 1961-62, it was 18:1 but by 1974-75 it had gone down to 14.7:1. However, there has been a slight rise since 1972-73, possibly reflecting the financial constraints facing higher education as well as a possible hesitation in hiring faculty, given the uncertainty of future enrolment trends (Table 3).

Comparing the student/faculty ratios according to field of study, we can see a great difference between the human sciences and natural sciences, with the latter having substantially lower ratios than the former at both the undergraduate and graduate levels (Table 4). In the human sciences, for graduate studies alone, there are rather large variations in both major sectors according to disciplines and regions. The numbers of full-time graduate students and full-time faculty were almost the same in Canada in 1972-73. In Canada this student/teacher ratio was 1.1 to 1; on a regional basis Quebec and Ontario had the same ratio as Canada, while the Atlantic and Western regions were lower (0.6:1 and 1:1, respectively) (Appendix III, 11).

The human sciences in Canada had a slightly higher full-time graduate student to faculty ratio than did the natural sciences - 1.2 compared with 0.9. The ratios among the disciplines in the humanities were very close. However, great variation existed within the social sciences, which ranged from a high of 7.2:1 for communication studies to a low of 0.3:1 for law. Most of the disciplines with high ratios - such as communication studies, administrative studies and social work - are oriented to graduate studies leading to professional master's degrees. Except for health sciences, not too much of a range was shown in the natural sciences. These general patterns prevailed in each of the regions, though the magnitudes varied.

Table 3

Full-time University Student/Faculty Ratios,
Canada, 1961-62 to 1974-75

Year	Full-time Enrolment (a)	Full-time Faculty (b)	Student/Faculty Ratio
1961-62	129,215	7,172	18.0
1962-63	141,388	7,890	17.9
1963-64	158,388	8,508	18.6
1964-65	178,238	9,125	19.5
1965-66	205,888	12,085	17.0
1966-67	232,672	14,394	16.2
1967-68	261,207	16,703	15.6
1968-69	293,370	18,864	15.6
1969-70	330,081	21,839	15.1
1970-71	354,379	24,604	14.4
1971-72	373,161	26,963	13.8
1972-73	377,704	27,735	13.6
1973-74	391,007	28,410	13.7
1974-75	441,448	30,046	14.7

(a) See notes to Tables 19-28 for definition and sources.

(b) Based on data supplied by Statistics Canada.

Table 4

Full-time University Student/Faculty Ratios, Canada, 1974-75

Field	Full-time University Degree-level Enrolment			Full-time Faculty (D)	Ratios		
	Undergraduate (A)	Graduate (B)	Total (C)		A:D	B:D	C:D
Human sciences	162,924	19,644	182,568	15,582	10.5	1.3	11.7
Fine arts	6,981	461	7,442	1,128	6.2	0.4	6.6
Natural sciences	94,851	10,336	105,187	12,563	7.6	0.8	8.4
Other and unspecified	23,250	855	24,105	773	Not applicable		
<u>Total</u>	<u>288,006</u>	<u>31,296</u>	<u>319,302</u>	<u>30,046</u>	<u>9.6</u>	<u>1.0</u>	<u>10.6</u>

Source: Based on unpublished data supplied by Statistics Canada.

During the 1960s and the early 1970s, class size (for many, considered as a significant indication of the level of education quality), as measured by the full-time student/faculty ratio, was declining sharply. However, by the mid-1970s it had started to increase slightly. This student/faculty ratio is predicted to stabilize at the 15 or 16 to 1 level, thus ensuring that the quality of instruction (measured in these terms) will not deteriorate markedly in the coming period of unstable enrolment and financial constraint.

3. Graduates

Graduate degrees are the visible measures of output from the teaching side of the graduate schools. The degrees signify the completion of a set program of study and provide the certification for future academic study or entry into the labor force.

The period 1961-62 to 1973-74 witnessed a great growth in the output of graduate degrees: total annual output rose from 3,134 to 12,092. The number of graduate degrees granted in the human sciences increased from 2,008 to 8,334, and in the natural sciences from 1,111 to 3,634; the humanities from 504 to 2,039, and the social sciences from 1,504 to 6,532 (Appendix III, 12).

In percentage terms, total annual degree output increased by 286 per cent between 1961-62 and 1974-75. The human sciences grew by 315 per cent, with the humanities showing a smaller increase than the social sciences (305% to 334%, respectively). Degree output in the natural sciences increased by 227 per cent.

The output of degrees, particularly on a discipline basis, fluctuates from year to year. This is an inherent characteristic of a production process which has no standard production time or standard rate of success in terms of output. Given current regulatory practices, therefore, it can hardly ever be assumed that of the initial enrolment a certain percentage of students will have completed their degrees by such and such a time. In addition, two outputs have to be measured: the master's degree and the doctorate, each having its own production characteristics. Over the ten-year period from 1961-62 to 1971-72, there have been few major changes in the percentage distribution among the fields chosen for detailed study. The share of degree output between the human sciences and the natural sciences has generally been

approximately 64 per cent and 35 per cent, respectively. The distribution ranges for the human sciences have been between 16 and 20 per cent of total degrees (i.e., all fields) for the humanities and between 43 and 48 per cent of total degrees for the social sciences (Appendix III, 13).

On a discipline basis, the share distribution of total degrees has changed only slightly. There have been considerable minor fluctuations. No discipline on a year-to-year basis has gone consistently down - that is, without at least some upturns during the decade. Some disciplines, however, have either increased or decreased their share over the decade. By 1971-72, English and religious studies had almost doubled their 1961-62 share, while philosophy's share was halved.

Because of the differing characteristics of the length of program and success rates and the differing goals of graduate education depending on the level of study, it is necessary to examine the output of master's degrees and doctoral degrees separately.

a. Master's Graduates

The output of master's degrees for all fields increased from 2,813 in 1961-62 to 10,258 in 1971-72. The human sciences grew from 1,913 to 7,342 and the natural sciences from 1,450 to 5,433. Within the human sciences, respective increases for the humanities and the social sciences were from 463 to 1,909 and from 1,450 to 1,628 (Appendix III, 14).

In terms of percentage change there was an overall increase of 265 per cent from 1961-62 to 1971-72. The human sciences showed a greater increase than the natural sciences: 284 per cent compared with 219 per cent. For the humanities and social sciences, the percentage increases were 313 and 275 respectively.

Considerable growth was shown by several disciplines over the decade. Some of the more notable increases were in religious studies (1,034%), anthropology (396%), communication studies (20,100%), sociology (928%) and political sciences (892%).

No consistent patterns were evident in the percentage distributions by field over the decade. The human sciences have been far more dominant than the natural sciences, the former ranging from 66 to 71 per cent of the total

degree output in any given year and the latter ranging from 27 to 32 per cent. The humanities have ranged between 16 and 21 per cent of the total and the social sciences between 47 and 53 per cent.

Changes were also evident in the distribution of output by various disciplines. Between 1961-62 and 1971-72, English more than doubled its share of total output of master's degrees, and religious studies and sociology each trebled theirs. Anthropology and communication studies also substantially increased their share. Philosophy, however, reduced its share by well over one-half, and education and administrative studies showed some decline at the end of the decade.

b. Doctoral Graduates

The output of doctoral degrees went up somewhat more rapidly than that of master's degrees. Overall output of doctoral degrees between 1961-62 and 1971-72 rose from 321 to 1,724. The increase for the human sciences was from 95 to 542 and for the natural sciences from 226 to 1,176. The respective figures were 41 to 207 for the humanities and 54 to 235 for the social sciences (Appendix III, 15).

This pattern is more vividly expressed in percentages: over the decade, the increase for all doctoral degrees was 437 per cent - 170 percentage points more than for master's degrees.

The increase for the human sciences was greater than that for the natural sciences; the respective percentages were 471 and 420. The growth of the social sciences (520%) was considerably larger than that of the humanities (405%). Some substantial increases were recorded by particular disciplines, such as French (1,900%), political science (1,500%) and sociology (1,400%). The slowest growth was recorded by philosophy (139%) and religious studies (229%).

Although the growth in output of doctoral degrees was considerable, it was uneven. Looking at year-to-year percentage changes in the output of all doctoral degrees, the fluctuations can readily be seen to jump by 20 or 30 per cent in some years but to be interspersed by increases of 10 to 20 per cent or less (Appendix III, 16).

The percentage distributions by field remained relatively stable over

the decade. The natural sciences overwhelmed the human sciences by over 2 to 1; the share held by the natural sciences ranged from 69 to 74 per cent, while the human sciences ranged from 24 to 30. In the 1970s, however, the human sciences increased their share. (In 1973-74, almost 38 per cent of the doctoral degrees awarded were to students enrolled in the humanities or social sciences.) The social sciences had a larger share of total output (13 to 20%) than did the humanities (9 to 12%). At the doctoral level, as opposed to the master's, there were no disciplines in the human sciences which completely overshadowed all the others. The largest human sciences disciplines in 1971-72 were psychology (7% of the total), education (5%) and English (3%).

c. Comparison of Master's and Doctoral Degree Output

In comparing the growth rates between the output of master's degrees and doctoral degrees, we can see that on a constant annual basis the performance on the doctoral side was superior in all major fields (Appendix III, 17). The growth rates, however, were large for both levels.

In all major fields, there has been a decline in the ratio of master's to doctoral degrees conferred (Appendix III, 18). A comparison has been made of the proportion of master's to doctoral degrees awarded in the years 1961-62 and 1971-72. For all fields combined, there was a decline in the ratio from 8.8 to 6. The natural sciences showed a small reduction in the ratio, but the doctorate has been the preferred degree in this field for several years. The human sciences showed a considerable drop; this was particularly noticeable in the social sciences. The situation in the social sciences is probably the result of considerable growth in doctoral degree output in some of the larger disciplines, such as education and psychology, and slower corresponding growth at the master's level in most disciplines.

In assessing the Canada-wide production of degrees in the high-growth decade of the universities - the 60s - several conclusions can be drawn. First, although there was considerable growth overall, the growth was relatively evenly balanced among fields and disciplines. Second, the growth rates were not as spectacular as were those of some other components of university education, such as university expenditures. Third, the master's degree was primarily a degree of the human sciences, particularly the social sciences,

while the doctorate remained by and large the preserve of the natural sciences. Indeed, compare the percentage distribution of human to natural science degrees by level: in 1973-74, it was 75 to 25 at the master's level, but 40 to 60 at the doctoral level. Fourth, the social science output at the level of the master's degree was composed overwhelmingly of professional/occupational disciplines, such as administrative studies, communication studies, education and social work. By 1971-72, these disciplines accounted for over 35 per cent of the total master's degree output and over half the output in the human sciences (52%); however, of these disciplines, only education figured significantly in the output at the doctoral level.

d. Regional Distribution of Master's Degrees Output

The output patterns vary markedly from region to region in Canada. At the master's level, most of the national output in 1971-72 occurred in Ontario, which accounted for 54 per cent, followed by the Western region (23%), Quebec (18%) and the Atlantic region (5%).⁴ This order of rank held true for all fields except the humanities, where Quebec and the Western region changed places. Both Quebec and the Atlantic region retained stable regional distributions in each of the fields, unlike Ontario and the Western region. Ontario, for example, ranged between a high share of 62 per cent for the humanities to a low of 45 per cent for the fine arts (Appendix III, 19).

Within the Atlantic and Western regions there were some pronounced variations from province to province.

In the Western region, British Columbia and Alberta shared the lead for total output of master's degrees (approximately 35% each), followed by Manitoba (18%) and Saskatchewan (11%). Except for the fine arts and, to a small extent, the humanities, British Columbia and Alberta had about the same shares in all categories. Manitoba had a larger share of its regional output in the natural sciences (25%) than in other fields, while Saskatchewan favored the humanities (18%) (Appendix III, 20).

The distribution patterns in the Atlantic region were far more concentrated than in the Western region. Nova Scotia produced over half this region's output of master's degrees (56%); New Brunswick, in second place, awarded 31 per cent of the degrees and Newfoundland the remainder. This rank order and

the approximate size of the percentages characterized the distribution in each of the major fields (Appendix III, 21).

There were great differences in 1971-72 in the field distribution within each of the various regions. Compared to the distributions for Canada as a whole, only Quebec came close to an exact matching up by major field. The proportion of human sciences to total degrees in both the Atlantic region (66%) and the Western region (67%) was lower than was the case for Canada as a whole (72%); Ontario, however, had a higher percentage (74%). Of all regions, Ontario had the highest percentage of output in the humanities (21% of total output) while the Western region had the lowest (15%). In the social sciences, however, the Western region had the highest percentage (55) and the Atlantic region the lowest (48). Even though the Atlantic and Western regions each had about the same percentage of human sciences to total degree output (66%), they differed substantially in the composition of that output: the Atlantic region showed itself stronger in the humanities (18%) than did the Western Region (12%).

In the Western provinces, the percentage of output in the human sciences was highest in British Columbia and Alberta (both slightly more than 70%) and lowest in Manitoba (56). In all the provinces except Saskatchewan (19) the humanities accounted for 9 to 11 per cent of total provincial output.

In the Atlantic region, Nova Scotia had the highest percentage of its total production of master's degrees in the human sciences (70) while Newfoundland had the lowest (58). Nova Scotia had a higher percentage of its output in the social sciences (51) than did each of the other two provinces (about 40%).

e. Regional Distribution of Doctoral Degree Output

The regional distribution of production of doctoral degrees was basically the same as for master's degrees. Regionally, Ontario produced the largest number (49%) of all doctoral degrees, followed by the Western region (29%), Quebec (17%) and the Atlantic region (4%). This ranking prevailed for all major fields except the humanities - where Quebec and the Western region reversed their positions - and the fine arts. Ontario awarded more than half of all the Canadian degrees in all fields except those in the natural sciences (Appendix III, 22).

Considerable differences were evident in the national percentage of

the various degrees produced by each of the regions. Excepting the fine arts, the Atlantic region produced its greatest share of doctoral degrees in the natural sciences (5%) and its lowest in the social sciences (2%). The corresponding percentages for the other regions were: Quebec, 23 in the humanities and 16 in the natural sciences; Ontario, 59 in the humanities and 47 in the natural sciences; and the Western region, with a high of 32 in the natural sciences and a low of 5 in the humanities.

Among the Western provinces, Alberta's share in the distribution of total output was highest, at 44 per cent, followed by British Columbia at 34 per cent. Manitoba and Saskatchewan were far down the list, with approximately 11 per cent each. According to the specific field, considerable variations existed in the shares produced by the provinces. The output in the human sciences and especially the social sciences was heavily concentrated in Alberta (68% for each category). Alberta and British Columbia shared the lead in the humanities and the natural sciences (Appendix III, 23).

The small doctoral output in the Atlantic region was heavily concentrated in Nova Scotia (66% of total regional output). This dominance by Nova Scotia prevailed in both the human and natural sciences.

As noted earlier, doctoral degree output was much greater in the natural sciences than in the human sciences. Compared to the national distribution of these two fields, the Atlantic region in particular, but also the Western region, showed strong preferences for the natural sciences. Ontario and Quebec leaned slightly less in that direction. The natural science output as a percentage of total output for each of the four regions was 84, 74, 65 and 64 per cent, respectively. In all regions except the Atlantic, there were more awards given in the social sciences than in the humanities; this was especially evident in the Western region.

There were considerable variations in the Western provinces in the distribution between the human and natural sciences. Alberta leaned more heavily than the other provinces in the West to the human sciences. The human sciences represented 38 per cent of the total output, the social sciences component accounting for four-fifths of this output. In the other provinces, from 14 to 18 per cent of their total output was reported in the human sciences. British Columbia, unlike the other provinces, had almost the same percentage of awards

in the humanities (9) and the social sciences (10).

In the Atlantic region, about 14 per cent of the Nova Scotia and New Brunswick output of doctoral degrees came from the human sciences. All of the Newfoundland awards were in the humanities.

f. Comparison of Master's and Doctoral Degree Output by Region

The relationship between the production of master's degrees and of doctoral degrees was relatively similar in all regions, except in the Atlantic Provinces. There the ratios were much higher for total output (8:1 compared to 5.6:1 for Canada), for output in the human sciences (32.5:1 compared to 13.5:1) and in the natural sciences (3.3:1 compared to 2.7:1) (Appendix III, 24).

The growth pattern of master's and doctoral degree production in major fields varied considerably from region to region during the years between 1968-69 and 1973-74 (Appendix III, 25). At the master's level, all regions except Quebec enlarged their total output by a greater percentage than did Canada as a whole. The Atlantic region showed the largest increase, 68 per cent. This regional pattern held true for growth in the human sciences. In the natural sciences, the greatest growth was recorded in Quebec (20%), while the Atlantic region recorded a decline. In all regions, percentage output in the human sciences grew much more than did the natural sciences: in the Atlantic region, for example, the human sciences more than doubled their output. The big exception to the considerable expansion in the other regions was Quebec. Some of the reasons for the slow growth in Quebec might be the late entry of the francophone institutions into graduate studies (there would not have been time enough to produce the final output figures for this survey) and the reclassification by Statistics Canada of the licence degree to either undergraduate or graduate status depending on the type of licence. The latter reason would do much to explain the slow growth at the master's level.

At the doctoral level, total output grew in all regions. The Atlantic region showed a 97 per cent increase, followed by Ontario (85%) and the Western region (71%). Quebec trailed far behind with a rise of only 51 per cent. The increases in all regions, except Quebec, were higher in the human than in the natural sciences. The growth in Quebec, however, was much better for doctoral than for master's degrees.⁵

The growth in the number of graduate degrees awarded in the past decade-and-a-half is proof of the continued interest and commitment to graduate education in Canada. This is particularly evident in the human sciences, where the numbers of graduates grew much more rapidly than in the natural sciences.

The number of graduate degrees awarded reflects the substantial number of highly trained people who have entered Canadian and foreign labor markets. Over the past four decades, changes in the economic and social structure have created the need for the services of very highly educated individuals and accordingly these graduates have been welcomed in the marketplace. These graduates are, at one and the same time, products of a successful investment in education and an important input into the economic and social vitality of society.

4. Degree-holders

From the results of the Highly Qualified Manpower Post Censal Survey 1973, produced by Statistics Canada and the Ministry of State for Science and Technology, it is possible to identify the composition of those holding master's and doctoral degrees by the discipline studied and the place of residence of the degree-holder as of 1973.

a. Composition of Graduate Degree-holders

Out of 121,130 holders of advanced university degrees resident in Canada in 1972, most had received their academic education in the human sciences (as measured by last highest degree obtained); the distributions between those with training in the human sciences and the natural sciences were 64 per cent (77,765) and 34 per cent (41,615) respectively, the balance being holders of degrees in fine arts. The social sciences dominated all fields with 45 per cent of the total; the humanities had less than half the share of the social sciences (19%).

On a discipline basis, those with graduate degrees in education numbered 18,560 (15% of the total), constituting the largest component of the human sciences, and were followed by those in administrative studies with 10,810 (9%) and religious studies, 5,655 (5%). Education and administrative studies combined accounted for a larger share of degrees than the humanities and over

half the share of the social sciences.

On an intraregional basis across Canada, the field distributions described in the previous paragraph are also valid at the disaggregated level for rank order but not for magnitude. The human sciences had the largest share of the total in Quebec (68%) and the lowest in the Western region (60%). In all regions the social science degree-holders constituted about 45 per cent of the total. The variations in the human sciences' share are due to the differing shares of those with backgrounds in the humanities; in Quebec, the percentage was 24 but in the Western region it was only 15.

Of the human science disciplines, education had the largest share of degree-holders in all regions, except Quebec where the lead was held by administrative studies. The respective percentages were 22 in the Atlantic region, 14 in Ontario, 21 in the Western region and 13 in Quebec. In second place, were administrative studies in Quebec (13%) and Ontario (10%), English in the Atlantic region (6%) and social work in the Western region (6%). Religious studies held third place in Quebec (6%), but a lower place in the other regions.

The provinces in the Atlantic region conformed closely to the profile already presented for the region as a whole. However, in the Western region, Alberta and Saskatchewan were both more heavily oriented to the natural than to the human sciences, and the humanities representation was much higher than the regional average in Saskatchewan (19%) and much lower in Alberta (12%).

The interregional comparison of graduate degree-holders by field of study reveals that Ontario had the largest share with 45 per cent of the national supply, followed by the Western region (24%), Quebec (24%) and the Atlantic region (7%). The second and third positions changed, however, depending on the field in question. The Western region was second in the natural sciences but third in the human sciences. Within the human sciences field, the Western region held a narrow lead over Quebec in the social sciences but came in a distant third in the humanities (Appendix III, 26).

b. Composition of Master's Degree-holders

Master's degree-holders constituted by far the largest percentage (78) of graduate degree-holders. There was considerable difference between the human

sciences and the natural sciences in the composition of this group. The master's degree was held by more people with human sciences training (86% of all human sciences degree-holders) than with natural sciences training (61%). Within the human sciences, master's degrees were held by more people with a background in the social sciences (88%) as opposed to the humanities (80%). The large share for the social sciences was accounted for primarily by three disciplines: administrative studies, communication studies and social work, each with a master's component of over 97 per cent (Appendix III, 27).

On a regional basis, the Atlantic provinces usually had the highest percentage of master's degree-holders in their graduate population, the percentages decreasing as one moves west. The relevant percentages for total graduate stock by region were 80 in the Atlantic region, 80 in Quebec, 77 in Ontario and 75 in the West. The only exception to this trend occurred in the natural sciences, where Quebec had a slightly larger percentage of master's degree-holders than did the Atlantic provinces.

The discipline distributions varied considerably depending on whether one looked at master's or doctoral degree-holders. Because of the large percentage of master's degree-holders relative to the total number of graduate degree-holders, it is not surprising that the field and discipline distributions were similar to those for master's and doctoral degree-holders combined. Of the 93,720 master's degree-holders, 71 per cent received their degree in the human sciences and 27 per cent in the natural sciences. Those with humanities degrees accounted for 20 per cent of the total and those with social science degrees for 52 per cent. On a discipline basis, degree-holders in education, of all the human sciences disciplines, constituted the largest group (with 18 per cent of all master's degree-holders), followed by those in administration studies (11%). Of the humanities disciplines, religious studies was the largest (5%).

In each of the regions, the field distributions were roughly the same, although there were variations in the composition. Those with human science degrees outnumbered those with natural science degrees; the range went from a high of 75 per cent in Quebec to a low of 67 per cent in the Western region. The range of those with humanities degrees went from a high of 25 per cent in Quebec to a low of 15 per cent in the West. For holders of social science

degrees, the high was 52 per cent in Ontario and the low 50 per cent in Quebec. On a discipline basis within the human sciences field, education has the largest share of master's degree-holders in all four regions except Quebec; education, as the largest discipline, ranged from 26 per cent in the Atlantic region to a low of 17 per cent in Ontario, while Quebec had only 12 per cent; the largest share in Quebec was held by administrative studies, 16 per cent. In second position came English language and literature in the Atlantic region (6%), education in Quebec (12%), administrative studies in Ontario (12%) and social work in the Western region (8%). For the humanities, English had the largest share in the Atlantic region (6%), Ontario (5%) and the Western region (4%); religious studies was largest in Quebec (9%).

There was a close similarity among the Atlantic provinces with regard to the information presented in the preceding paragraph, but not so in the West. There, the share of total master's degrees held by those with a human sciences background ranged from a high of 70 per cent in British Columbia to a low of 62 per cent in Alberta. The share of those with humanities training ranged from 21 per cent in Saskatchewan to 12 per cent in Alberta.

At the master's level, Ontario had the largest share of degree-holders in Canada (45%) (Appendix III, 28). Quebec followed with the second largest share, 25 per cent, just edging out the Western region by a little over one percentage point. The Atlantic region had 7 per cent. The distributions for the human sciences were similar in order and magnitude to these overall distributions. For the humanities, though, the magnitude changed substantially for the Western region and Quebec, with the respective percentages being 19 and 31.

In the following regional analysis of percentage distribution in the various disciplines, we distinguish only those disciplines that had percentages significantly higher than those of the disciplines' appropriate field. In Ontario, this was true for classics (49%), history (49%), English (52%), other modern languages (60%), communication studies (59%), geography (53%), interdisciplinary studies (53%) and political science (55%). Thus we can see, for example, that although Ontario had 43 per cent of the master's degree-holders in the humanities in Canada, it had 49 per cent of those with similar degrees in classics and history. In Quebec, the following disciplines fell into this category: linguistics (41%), philosophy (52%), religious studies (47%), administrative studies (36%), anthropology (31%), law (31%), social work (32%)

and sociology (35). The pertinent disciplines in the Western region were archaeology (78%), linguistics (30), anthropology (30), education (31) and social work (32); and in the Atlantic region archaeology (11%), classics (12) and history and English (10% each).

c. Composition of Doctoral Degree-holders

Turning to the doctoral level, we can see that the natural sciences dominated the field distribution in Canada. Of doctoral degree-holders, 59 per cent received their degree in the natural sciences compared with 41 per cent in the human sciences. At the doctoral level the shares held by those trained in the humanities and those in the social sciences were fairly similar - 17 and 21 per cent, respectively. This was completely different from the pattern for holders of master's degrees. On a discipline basis, the largest human science discipline was education, with 6 per cent of total degrees; psychology had 6 per cent and religious studies, 4 per cent. Holders of degrees in administrative studies, so prominent at the master's level, constituted only 1 per cent of total doctoral degree-holders.

The distribution between holders of human science and natural science degrees was fairly similar in each of the four geographic regions; the range for holders of human science degrees went from a high of 43 per cent in Quebec to a low of 38 per cent in the Atlantic region. Much more divergence was evident for the humanities; the high was Quebec, with 22 per cent, and the low was the Western region, 13 per cent. The human sciences discipline with the largest number of doctoral degree-holders in the Atlantic region was English (6%); in Quebec, religious studies (8%); in Ontario, psychology (7%); and in the Western region, education (12%). The second largest for the respective regions was education in the Atlantic region (6%), philosophy in Quebec (6%), economics in Ontario (4%) and psychology in the Western region (5%).

The differences among the provinces in the Atlantic and Western regions in the major distributions of doctoral degrees were not significant, except for the low share (33%) of doctorates in the human sciences in Saskatchewan.

In comparison with the master's degree, doctoral degree-holders have different residency patterns, particularly in Quebec and the Western region. Ontario, still the region with the largest share of doctoral degree-holders,

had 46 per cent, or about the same share as for those with master's degrees. The rank order for the other regions was: Western region (27%), Quebec (21%) and the Atlantic region (6%). The above pattern was similar for the human sciences as well. The distribution of humanities degree-holders in Quebec and the Western region deviated, however (27 and 21%, respectively), as did their distribution of social science degree-holders (19 and 32%, respectively) (Appendix III, 29).

As was done for master's level degree-holders, the discipline distributions among the regions at the doctoral level are highlighted by presenting only those percentages significantly higher than the relevant field percentages. In Ontario, archaeology (57%), classics (64), other modern languages (58), economics (52), geography (59), interdisciplinary studies (60), political science (61) and psychology (52) were much higher than their respective field percentages; in Quebec, French (38%), philosophy (40), religious studies (41), administrative studies (26) and law (39); in the Western region, archaeology (29%), English (29), linguistics (39) and education (52); and in the Atlantic region, only history (9%) and English (10%).

d. Place Where Graduate Degree Was Obtained

Where did these graduate degree-holders obtain their degrees - in Canada or abroad? According to the Highly Qualified Manpower Post-Censal Survey, 1973, of the 121,130 graduate degree-holders in Canada in 1973, almost two-thirds had received their most recent and highest graduate-level degree from a Canadian university. Except for the fine arts, this percentage was similar for all major fields of study. The human science graduates (particularly those in the social sciences) got a larger share of their degrees in Canada than did the natural science graduates (Appendix III, 29).

Of those who received their most recent highest degree outside Canada, the majority obtained it in the United States; about one-quarter of all degrees were obtained there. The United Kingdom was the second most popular place outside Canada to obtain degrees, providing about 5 per cent; and France was next in line, with 3 per cent.

Of the Canadian universities, those in Ontario awarded about 32 per cent of all graduate degrees. Those in Quebec had the second largest number, with

17 per cent, while universities in the Western and Atlantic regions awarded about 13 and 4 per cent, respectively. No major differences in these overall percentage shares existed for the major fields, except for the humanities, where Quebec was higher and the Western region was lower than expected.

Generally, there were no significant differences in the output of the universities in the various geographic regions, except for the United Kingdom. The usual pattern was for output to be predominantly in the form of human science degrees, ranging from 58 to 68 per cent of total regional or national output. In the United Kingdom, however, the situation was reversed in favor of the natural sciences (Appendix III, 30).

In some disciplines there tended to be distinct preferences for study in Canada. Of those who took a graduate degree in the humanities, 65 per cent did so at Canadian universities. In philosophy (73%) and French (75%), the percentages were considerably higher. For the remaining disciplines in the humanities, the range was 61 to 67 per cent. For the social science disciplines, however, there was much more variation. For all social science disciplines, 70 per cent attended Canadian universities. However, for administrative studies and social work, the percentages were considerably higher (78 and 89%, respectively), while the percentages for anthropology (48), economics (58), interdisciplinary studies (57), law (40), political science (46) and sociology (55) were markedly lower.

e. Place Where Master's Degree Was Obtained

Of the 93,720 holders of master's degrees, 73 per cent obtained them at Canadian universities. There were few differences for any of the major fields (except fine arts). Of the 27 per cent who got their degrees abroad, most did so at American universities - 22 per cent of all master's degrees were obtained in the United States. The second most important foreign country from which to get a master's degree was the United Kingdom: 2 per cent of graduates got their degree there, a small percentage compared with that for the United States (Appendix III, 31).

About 35 per cent of all holders of master's degrees obtained them in Ontario. The relative percentages for Quebec and the Western and Atlantic regions (in order of size of output) were 18, 14 and 4. The only significant

deviation from these percentages, on a major field of study basis, occurred in the humanities in Quebec (high at 24) and the Western region (low at 9).

Most master's degree-holders, except for those who got their degrees in the United Kingdom, took them in the human sciences (65 to 75%, depending on the region, except for 47% in the U.K.). Universities in the Atlantic region and Quebec produced a smaller share of social scientists (46 and 50% of their respective total outputs) than in most other regions, except the United Kingdom and other foreign countries. A large percentage of those who received master's degrees from foreign countries other than the United States or United Kingdom took their training in the humanities (Appendix III, 32).

f. Place Where Doctoral Degree Was Obtained

Far fewer doctoral than master's degrees were obtained from Canadian universities. Only 42 per cent of all doctoral degrees were obtained from Canadian universities. This percentage rose to 48 per cent for the natural sciences, but dropped to only 34 per cent for the human sciences. United States universities awarded 32 per cent of all doctoral degrees going to Canadians. This percentage was higher in the human sciences (42%) but lower in the natural sciences (25). However, in the social sciences half of all doctoral degrees were obtained from American universities. British universities awarded 14 per cent of all doctoral degrees - a larger share than that of either the Western region or Quebec. The U.K. output, however, was more significant in the natural sciences than in the human sciences (Appendix III, 33).

Ontario universities awarded 19 per cent of all doctoral degrees obtained, while the universities in Quebec, the Western region and the Atlantic region awarded 12, 10 and 1 per cent, respectively. Quebec universities and those in the Western region had low shares in the social sciences and humanities, respectively.

Considerable variations existed in the field composition within geographic areas. The awarding of doctoral degrees to Canadian recipients by United States universities was heavily oriented toward the human sciences (53%); while in the United Kingdom, the Atlantic region, Quebec and the Western region the comparable percentages ranged from only 23 to 30 per cent (Appendix III, 34).

In looking at that portion of the Canadian population holding graduate degrees, one notices immediately the impact of history on the development of this reservoir of human talent. The influences of immigration policy and the late flowering of graduate schools in Canada have meant that a large percentage of our population has either come to Canada with advanced education in hand or have gone abroad to obtain it. The discipline of study reflects the demands (economic and social) not just of the present generation but also of several past generations; the same profile taken again 50 years from now would likewise exhibit the bias of today's generation. For instance, the prominence of religious studies in the education of those who studied in Quebec is a direct reflection of the strong role played by the church in Quebec in previous years. In other regions, religious studies as a discipline did not figure as prominently, nor was the church in such a central position.

Where graduate degree-holders reside is a direct reflection of personal choice on the one hand and the existence and availability of suitable employment on the other. In many disciplines, particularly those in the more technical fields such as the natural sciences, the holder of a graduate degree may have to move from one locality to another to find employment in which the skills and training he or she acquired at university can be put to optimum use. The patterns presented here bear this out fairly clearly.

5. Proportion of Graduates among the Population

a. Geographical Distribution within Canada

The percentage of people in the 20-and-over age-group with at least one university degree in Canada as of 1971 was about 4.6. The percentage was slightly higher in Ontario and the Western region, lower in Quebec and noticeably lower in the Atlantic region.⁶ For those with graduate degrees, the percentage for Canada was 0.9, with Ontario slightly higher and the other regions lower than the all-Canada percentage. For those with undergraduate degrees, the percentage for Canada was 3.7, with Ontario and the Western region higher and Quebec and the Atlantic region lower. In the Western region, Alberta and British Columbia made strong showings. But in the Atlantic region only Nova Scotia was at all comparable to the Canada-wide pattern (Appendix III, 39).

When comparing doctoral degree-holders with the 20-and-over age-group, the percentage for Canada was 0.2, higher in Ontario (0.3), but lower in the Atlantic region (0.1). For those with master's degrees the percentage for Canada was 0.7, and Ontario was the only region in which it was higher (0.9).

When comparison is made of graduate degree-holders to total degree-holders, the percentage for Canada was 20.1, with Ontario recording a higher percentage (22), the Western region a lower (18), and the other two regions close to 20.

When comparing the distribution of those with graduate degrees between master's and doctorate recipients, the national percentage of those with master's degrees was 77, Quebec 80, Ontario 77, the Atlantic region almost 80, and the Western region slightly less than 75.

Distributions of degree-holders reveal some divergences from the distributions of the population in the 20-and-over age-group from region to region. Particularly at the graduate level, Ontario displayed a disproportionately large percentage of degree-holders (i.e., ranging from 40.7 for undergraduates to 45.7 for doctorates, compared with 36.6% for the Ontario population in this age-group). Quebec and the Atlantic region were lower, especially at the doctoral level. The Western region was slightly higher at the undergraduate and doctoral levels, but lower at the master's level (Appendix III, 35).

b. Linguistic Distribution in the Province of Quebec

For Quebec, data are available on degree-holders by mother tongue. These data, however, refer only to those born in Canada. If foreign-born individuals were to be included, the proportion of anglophone degree-holders would be increased.

Considerable differences exist among degree-holders born in Canada, resident in Quebec, by mother tongue.⁷ As can be expected, the francophone group is much larger than the anglophone or other linguistic groups. The francophone group comprises some 70 per cent of all degree-holders in Quebec; this is true at both the graduate and undergraduate levels, although the distributions within the undergraduate components vary. When compared with the distributions by mother tongue for the total population of Quebec (includes both immigrants and Canadian-born), the distributions of the degree-holders display considerable divergences. The francophone and other

nonanglophone degree-holders are underrepresented in relation to the total francophone and nonanglophone population (i.e., 70.6 and 1.3% compared with 80.7 and 6.2% of the total population), while the Anglophones are overrepresented. If one were to standardize the bases of each of the population sets the results would probably be even more lopsided, given the large inflow of immigrant nonfrancophone degree-holders into Quebec (Appendix III, 40).

The distributions within each of the linguistic groups is also revealing. The Anglophones have a much higher percentage of degree-holders relative to their total population in Quebec than do the other two groups. The anglophone population has 4.3 per cent degree-holders, more than twice as many as the Francophones and almost ten times more than the other nonanglophone groups. This pattern prevails regardless of the level of degree obtained.

Looking at distributions by mother tongue and graduate degree level for various fields and disciplines, some fields and disciplines at the graduate level stand out as being more dominated than others by Francophones. Francophones at the graduate level are more prevalent than Anglophones in the human sciences and fine arts but not in the natural sciences; relative to the all-field percentage of 71, the percentage of Francophones is 74, and for the human and the natural sciences, 77 and 62, respectively. Francophones are much more numerous in the humanities than in the social sciences, although their showing in the social sciences at the doctoral level is much stronger than at the master's level. At the discipline level, Francophones are clearly more numerous in philosophy, religious studies, anthropology, interdisciplinary studies, geography and French language and literature (each being over 85% francophone) (Appendix III, 41 and 42).

When comparing distributions at the graduate level by mother tongue, Anglophones have a higher percentage of graduate degree-holders with master's degrees in the humanities and a lower percentage in the natural sciences than do the Francophones, with the other fields being comparable.

c. Historical Growth of Participation Ratio

From 1940-41 to 1974-75, great gains were made in Canada and all its regions in raising participation rates in full-time university education. In 1940-41, full-time enrolment at universities in Canada totaled 36,454, or 0.32 per cent

of the total population of Canada; by 1974-75, the number reached 414,448, or 1.84 per cent.

Each region had increases of similar magnitude. The growth in participation rates was higher at the graduate level (a seven-fold increase from 1940-41 to 1970-71) than at the undergraduate level (a six-fold increase for the same span). The growth at the graduate level was particularly strong in the Western region and in Ontario. The increases in undergraduate participation at the regional level were fairly similar; Ontario's growth appears slower, but structural differences, particularly the existence of Grade 13 in the secondary school rather than the university framework, are largely responsible for this comparatively poorer showing until the 1970s (Appendix III, 43).

The same pattern prevails when full-time enrolment is compared with the 20 to 29 age-group in the general population. Participation increased substantially in Canada from 1.82 per cent in 1940-41 to 10.34 per cent in 1974-75. Growth during the 1960s was great: participation more than doubled. Participation growth was much more impressive in the first than in the second half of the 1960s (Appendix III, 44).

In all regions, the rate of growth of enrolment, and especially graduate enrolment, far outpaced either population count (i.e., the 20 to 29 age-group or total population). Enrolment growth overall was most substantial in the Western region, while population grew most rapidly in Ontario (Appendix III, 45).

The size of population available for full-time university education has changed in each of the regions in the last decade. The general pattern has been a decline from 1940-41 to 1960-61, but increases to 1974-75. During the substantial growth in enrolment (in the 60s), population was also increasing. The availability rate in 1974-75 was highest in Quebec and lowest in the Western region. Except for 1951, Quebec has consistently had the highest availability rate of any region of Canada (Appendix III, 46).

The great increase in the participation ratio during the 1960s was primarily due to the increased number of people eligible to attend university. The development of the high school system in Canada to that of a mass system, one in which most teenagers in the population would be able to attend and

complete high school, ensured the universities of the 1960s a large pool of undergraduate recruits. As the number of undergraduates increased, the pool of those eligible for graduate school was also enlarged. The demographic increases in the relevant 20 to 29 age-group increased somewhat but certainly not enough to explain the massive increases in enrolment during the previous decade. The events of the 1960s are better explained by greater eligibility rather than greater availability. In the 1970s, Canada has acquired, at the university level, the rudiments of a mass system. The percentage of students eligible for university training will not increase markedly; growth in the university ranks in the future will be more dependent on the number of people in the prime age category, 18 to 29. With the slowdowns and declines in the available age-group likely in the 1980s, enrolment in the universities will probably also decline.

The percentage of full-time graduate students between the years 1940-41 and 1974-75 has changed markedly. The general trend has been a big increase in the graduate component over this period, reaching a peak in 1967-68 and declining thereafter. The main reason for the decline in the 1970s was a slowing down at the graduate level itself, rather than a drop at the undergraduate level. The national pattern was evident in the regions as well, even though the year when the peak was reached varied: 1967-68 for Quebec and 1969-70 for the other regions. Ontario has consistently had the highest graduate component and the Atlantic region the lowest, with Quebec and the Western region exchanging positions depending on the year in question (Appendix III, 47, 48, 49, 50, 51 and 52).

University education, and graduate education in particular, has progressively attracted a larger and larger percentage of the normal university age-group (20 to 29) of the Canadian population. While far from becoming a universal feature of life for young Canadians, higher education has slowly been moving toward a mass type of model, especially when post-secondary/non-university education is also included.

University degree-holders in Canada are, however, still a small minority of the Canadian population over the age of 20, and holders of graduate degrees an even smaller constituent.

6. International Comparisons

From the previous pages, there emerges a sufficiently clear overall picture to assess the current state and trends of graduate studies in Canada. It would also be very informative to compare the situation of Canadian universities with that of comparable foreign institutions. We have consulted OECD data but the latter have proven of limited use on this point: the classification groups are not always the same as those used in Canada and the questions raised by the OECD are not necessarily those confronting us.⁸ Since the OECD examines the Canadian situation on the basis of standard criteria for all countries studied, we considered it useful to review these studies briefly. The findings may not always be directly comparable to ours but some valuable information emerges on the relative position of Canada at the international level.

The number of postsecondary students in Canada is relatively high: the growth rate remains slightly above average and the ratio of students to their normal age-group as a whole is markedly higher than in all countries except the United States (Appendix III, 55, 56 and 57).

Of the five OECD countries under consideration (Canada, France, Norway, the United Kingdom and the United States), Canada had the lowest proportion of graduate to total university enrolment in each of the three years studied (1960-61, 1964-65 and 1970-71). Norway had the largest proportion; in 1960-61, Norway's proportion was four times that of Canada's, but by 1970-71, this margin had declined to just over double (Appendix III, 47). All countries showed an increase for the three years studied. Canada, however, had the biggest increase from 1960-61 to 1970-71, about double; the United States increased moderately, while the other countries had only slight increases.

For each of the 19 OECD countries studied, increases in the number of graduates (including BAs) were reported between 1960 and 1970. Canada more than trebled the number of graduates between 1960 and 1970 and was only slightly behind Sweden, which had the biggest change. Both had much more impressive performances than did the United States or Japan, which only doubled their production of graduates (Appendix III, 59).

As a percentage of a single-year age-group, the United States was far ahead of any of the 19 OECD countries studied. Canada was in second place, and

over the decade narrowed the gap between itself and the United States. All countries increased their percentages - Canada's more than doubled between 1960 and 1970.

In the United States, in 1969-70, most of those gaining university degrees did so in the human sciences rather than the natural sciences (pure and applied sciences). This happened regardless of the type of degree; about four-fifths of those getting bachelor's and master's degrees followed this pattern, but at the doctoral level, the distribution was only slightly in favor of the human sciences (Appendix III, 49).

In Canada, the same tendencies prevailed (except at the doctoral level), but the magnitudes differed considerably. In 1971-72, about two-thirds of the degrees awarded at the undergraduate and master's levels were in the human sciences; at the doctoral level this distribution was reversed, with slightly more than two-thirds of the awards being made in the natural sciences.

Considerable changes occurred in Canada between 1961 and 1970 in the importance of postsecondary education in the socioeconomic life of the country. The transformation appears most striking when international comparisons are made.

In 1961, Canada devoted 0.5 per cent of its Gross National Product (GNP) to postsecondary education, ranking third among 11 other major OECD countries.⁹ At this time, Canada's allocation was just equal to that of the average in this selected group of nations. By 1970, however, Canada reached first place: with 2.7 per cent of its GNP going for postsecondary education, it was allocating more than twice the amount of the average country in this group. The percentage allocated in 1970 was five times that of 1960; no other country recorded such a large increase in resources devoted to this activity (Appendix III, 50).

Between 1960 and 1970-71, Canada and six other OECD countries increased student/teacher ratios in institutions of higher education. The increase in Canada amounted to almost two additional students per teacher and was much smaller than in Sweden, where the ratio almost doubled (from 10.1 to 19.5 students per teacher). In contrast, the United States showed a slight decrease in the ratio. For both years cited, however, Canada had the eighth highest ratio and was far down the list from the countries with the lowest ratios

(usually considered the preferred situation) (Appendix III, 51).

In the development of university-level education and research in the past decade-and-a-half, Canada has been in the forefront of the industrially developed nations of the world. It is now one of a small number of countries which has a well-developed participation rate among the normal university-age population. This transformation of Canadian higher education entailed great expenditure, as well as an enormous marshalling of teaching and administrative personnel. Given the poorly developed infrastructure of Canadian universities in the 1950s, the status they have attained is remarkable, whether considered on a domestic or an international basis. The preceding considerations bear, however, on very general questions. By examining the actual situation more closely and by restricting our analysis to graduate studies in the humanities, in addition to the indisputable facts, we will identify some serious gaps to which attention should be directed.

Notes

1. Source: Statistics Canada, unpublished data. The amounts mentioned here refer only to the direct costs of research. The indirect costs, borne in large part by the general budget of the universities, are unfortunately still unknown. They are probably about 30 or 40 per cent of the direct costs. See the excellent study prepared by a special committee headed by Professor Théodore Wildi: Coûts indirects des activités d'enseignement et de recherche à l'Université Laval (Quebec: Laval University, 1975). The Vice-Rector (Research) at Laval University, Jean-Guy Paquet, is responsible for the study.
2. Particularly in Ontario, it has become increasingly more difficult to specify whether undergraduate students are in arts or science faculties. This is truer of students in pass degree than honours degree programs. The fact that students, especially in Ontario, do not have to declare their major field of study until their second or even third year of study in a three-year program means that no real distinction is possible, and therefore they are classified as being in a combined "arts and science" category. The reduction in number of prerequisite courses needed to get a general undergraduate degree in some disciplines has aggravated the classification problem. When a student happens to have one or two more courses in his or her major discipline than in any other discipline, a high degree of concentration in the major discipline is not evident.
3. The enrolment in Arts and Sciences combined has increased over this period of time at the undergraduate level. Accordingly, the proportion of enrolment in the human sciences has probably not changed much from the 67 per cent reported in 1967-68.
4. The year 1971-72 was chosen as being representative of recent developments in graduate education.
5. It would also be useful to compare the number of master's and doctoral degrees with that of bachelor's degrees. In 1972-73, a total of 70,696 bachelor's degrees and 1,929 doctorates were conferred - a ratio of 37 to 1.
6. The degree-holders indicated in these tables are classified by highest degree awarded; therefore one is counting the number of individuals according to their qualifications and not the total number of degrees possessed by these individuals. If the latter were the case, the numbers would be considerably increased to account for holders of more than one degree. The population group aged 20 and over has been chosen to represent the most comparable age set for those with university degrees.
7. The distributions by mother tongue of degree-holders for Quebec refer only to the Canadian-born. The information on degree-holders is presented according to highest degree obtained, not total number of degrees acquired.

8. The Organization for Economic Cooperation and Development, Towards Mass Higher Education. Issues and Dilemmas (Paris: 1974). It is important to define the realities corresponding to the terms used by the OECD. Thus, "higher education" generally corresponds to postsecondary education, including, for example, the "community colleges" in Ontario, the CEGEPs in Quebec, etc. The term "graduate" refers to the holder of a college degree, and "postgraduate", to a master's or PhD student.
9. Australia, Belgium, Canada, Denmark, France, Federal Republic of Germany, Japan, Netherlands, Norway, Sweden, U.K. and U.S.A.

V OBJECTIVES OF GRADUATE STUDIES

When dealing with the question of graduate studies it is necessary to discuss their purpose before specifying their programs.¹ This question is most appropriate for Canada, especially in the humanities and social sciences, since most developments regarding the latter are quite recent and it would be useless to seek out firmly established principles and practices.

In the humanities, up to the early 1960s and to a lesser degree since, we have relied on the United States, Great Britain and France for doctoral studies. The Canada Council did not adopt the long-established practice of the National Research Council which, with rare exceptions, grants doctoral fellowships only in Canadian universities. Moreover, the Canada Council did not follow the pattern of the National Research Council and associate its faculty research grants with research support for graduate students. Implicitly faculty research in the humanities and social sciences was assumed to be individual research which was not necessarily associated with graduate training.

Until recently, universities have not been very concerned about this *laissez-faire* policy of the Canada Council, not being very interested themselves in graduate studies - even less in research - in these sciences. The phenomenal growth in the number of undergraduates in the 1960s forced universities to favor this level of education: this reinforced the *laissez-faire* tendencies, though more teachers were concerned about graduate studies and research. Only since the end of the 1960s have universities given a higher priority to the quality of graduate studies in the humanities and social sciences. This interest comes, unfortunately, at a time when universities are facing a wave of financial restraints, and many hopes are lost.

The extensive growth of undergraduate studies over the last 15 years has deeply influenced the design of graduate studies. Whether through romanticism, conviction or opportunism, it is still being argued that universities must continue to favor the undergraduate level; this affirmation is in a sense supported by the present circumstances which are unfavorable to the full development of graduate studies. Notwithstanding the obvious interest in graduate studies, the latter's programs continue to be dealt with as mere extensions of the undergraduate level. Force of habit and the vagueness of

requests on the part of those responsible for graduate studies do not help in this regard. Yet graduate studies are unique and must be distinct from undergraduate studies.

At a time when they are seeking to adapt to the numerous pressures resulting from the considerable quantitative growth of the last 10 or 15 years, Canadian universities must aim at quality first, notably at the graduate level and more particularly in doctoral studies.

The report of the task force at Queen's University accurately and severely summarizes the effects of the development of universities on graduate studies, and it appeals for the pursuit of quality:

Why does the issue of quality press so heavily on Canadian higher education today?... The size and number of Canadian universities exploded with the rapid growth of Canadian industrial society and population in the years following World War II... In the haste to build, the quality of faculty and students was too often sacrificed on the altar of need and speed... Imports from foreign countries were vigorously encouraged to fill urgent vacancies, and although many fine scholars were recruited, greater attention could often have been paid to quality. Bodies not qualifications seemed to be the watchword. Today we have begun to pay the penalty. Many faculty members and graduate students in the humanities and social sciences are of the highest quality... But we also find a depressingly large number of persons of substantially lower than desired ability... Our inability to hold our best students and faculty and our relative indifference to the need to do so contributed its share. As is well known, until quite recently the best Canadian graduates not only studied in the United States and Europe but were enthusiastically encouraged in this move... Canadian universities seemed to remain content with teaching undergraduates. One of the beneficial results of this preoccupation with and preference for undergraduate education was that in some places they produced extremely well-trained students. On the other hand, because there were so few first-rate graduate students in the face of more numerous outstanding undergraduates, the saliency, status and influence of the graduate component in the university became fixed at an extremely low level... Graduate programs like graduate schools, were hastily pasted onto an existing undergraduate organization. Graduate courses have too often been mere extensions of undergraduate ones; teaching techniques have been simply transferred from the lower to the higher level of education. There has been too little special attention to the peculiar needs of graduate students... Any perceptive graduate student or intellectually dedicated faculty member could quickly recognize this low status given to graduate education in the university... Many graduate students and their research-oriented teachers have become disillusioned by having to work within a system largely geared to the needs of undergraduates. ²

The objectives of graduate studies must also be assessed in relation to other considerations. Canadian universities that have developed graduate

studies in the humanities and social sciences have done so almost exclusively at the master's level. Students in the humanities account for 67 per cent of students as a whole at the master's level, but only 54 per cent of those at the doctoral level. Those at the master's level in the humanities and social sciences account for 7 per cent of students as a whole, but only 2.6 per cent of students in the humanities are at the doctoral level compared with 4.4 per cent in the natural sciences.

In addition to these quantitative data, there is the influence of older traditions and the established fact of superior performances. As pointed out in the quotation from the report of the working group at Queen's University, students in the natural sciences have long been encouraged to work on their doctorate in Canada; however, in the humanities and social sciences, students completing their master's degree have been urged to some extent to pursue their doctoral studies outside Canada for reasons that are valid over the short term but suicidal in the long run. Similarly, there has not been the same level of effort to attract to Canada foreign students at the doctoral level, as has been the case in the natural sciences; this is probably because of a lack of confidence in the Canadian product. These opposing views with regard to graduate studies in the universities - we have indicated this above - have also prevailed in the research councils.

In short, the following picture presents itself: until recently, fewer doctoral students in the human sciences than in the natural sciences, though the situation is reversed at the master's level; almost a total absence in the human sciences of programs focused specifically on doctoral and postdoctoral studies; poor training structure for students at this level; a very high proportion of "part-time students", i.e., those who have completed their studies and are writing their thesis outside the university; excessive slowness in the writing of the thesis; a high percentage of dropouts; little interest in research on the part of the university; teaching and research links that are too loose; and inadequate integration of students in faculty research.

Is the picture too gloomy? Some say yes. We know the limits of comparisons between the natural sciences and human sciences on these points; besides, a rectifying operation is now underway and we will discuss this later on. Others would consider our criteria elitist. Many of our observations apply

to American and European universities, even to some of the best. Nevertheless, it is necessary that the rectification now underway be accelerated. Regarding our bias in favor of quality, especially at the doctoral level, what arguments can be brought to bear against us when we are seeking to establish the proper conditions for the development of this high level of scholarly education essential to an industrially developed society such as ours?

In view of the particular nature of individual dispositions and the degree of motivation toward these studies, the extent of human energies and financial costs invested and the necessarily limited but indispensable uses society can make of these educational products, we could not validly invoke the principle of democratization of education, at least as it is now conceived for elementary and high school education or as could be conceived if we assumed the systematic pursuit in Canada of the goal of a "people's" university or university for the "masses". Cost should not be a major barrier to university studies, especially at the graduate level, for a student who has the intellectual potential and the desire. The restrictions on admission should be determined by academic standards and by considerations such as the job market.³

We will now more specifically determine, in the light of the preceding observations, functions of graduate studies, their main prerequisites and some of their consequences for the university and society.

1. Functions of Graduate Studies

Graduate studies are expected to extend and expand the functions of the undergraduate level: the conservation and transmission of knowledge. They are also seen as having a specific function: the production of new knowledge.

The university is the repository and guardian of an inalienable heritage: that of knowledge acquired as a result of the efforts of numerous generations of scientists and humanists from a multitude of disciplines. The university, particularly at the graduate level, must critically assess and redefine the aesthetic, moral and social values conveyed by this scientific and humanist knowledge. Several reports of our task forces, especially those of the universities of Montreal and Toronto, emphasize all of these duties. According to the task force of the University of Toronto:

The first aim is to conserve material from the past, the cumulative legacy of man's history, including his art, literature, social customs and beliefs. The main reason for conserving the past is because it holds the roots of the present. The past helps to provide man with identity by nourishing a sense of his origins, but it is difficult to preserve, and much of it is puzzling and obscure because so much has been lost. Yet study of it is important because man does learn from experience, and while he may not always avoid repeating the same mistakes, knowledge of the traditions and of the wisdom of those who went before provides a better chance to improve the future than man would have without it.⁴

The second function of the university is to transmit the knowledge of which it is the repository; this entails the training of new teachers, researchers and specialists through instruction and other teaching methods like thesis supervision and laboratory and library work. As for the first function - the conservation of acquired knowledge - the transmission of knowledge is not achieved exclusively through graduate studies. On the contrary, this is a main characteristic of the undergraduate level. Here again, it is more a matter of different requirements between the two levels. In addition, the pursuit of quality differs according to the master's degree or doctorate. Bora Laskin has described very well the nature of these requirements in a report he prepared for the University of Toronto:

The master's degrees in the arts and sciences should...be considered as certification of two attributes: familiarity with a body of knowledge in a specified number of fields and acquaintance with the methods of research in the particular discipline which will permit at least a beginning of systematic and independent inquiry...The PhD ought to...stand for certification of four attributes in any of its holders: first, that he has assimilated advanced instruction in a specified number of fields of knowledge; second, that he is competent to interpret the data or literature of those fields in a public way; third, that he has demonstrated capacity to conduct independent research and to make a contribution to knowledge in his chosen field, the findings of which are worthy of publication; and fourth, that where he so intends, he is judged capable of being associated in the instruction of university students in his general area of competence.⁵

The responsibilities of the university extend not only to the conservation and transmission of knowledge but also to the discovery and systemization of new knowledge through research. It is first and foremost by emphasizing research and its quality that a university displays a concrete interest in graduate studies. Research is certainly also a concern of the undergraduate level but it is more a characteristic of the master's level, and especially of

doctoral and postdoctoral studies, and the quality of graduate education is directly dependent on it. Graduate studies, particularly at the doctoral level, develop the required skills, methods and mental processes for pursuing a career in university teaching, research and certain other professional fields. According to the task force at Queen's University:

Research is a profession that has its own special characteristics and like other professions not everyone ought to expect to be able to excel in it. It assumes a capacity to deal with ideas at a high level of abstraction and yet a facility in reducing them to their particularities. It requires an extraordinarily high degree of motivation to pursue intellectual inquiry. The rewards may be few and far between. In the end the only reward may be the satisfaction of having tried, regardless of recognition or success, to add in some small way to our understanding of and knowledge about man in society... To fulfill its special task in this area, graduate education has special objectives overlapping with but different in emphasis from those of undergraduate education or of training in the practising arts and professions... What distinguishes graduate from undergraduate education? First, and perhaps more than anything else, the difference arises out of the kind of commitment required. For the first time the graduate student is called upon to make a long-term commitment to a career of research or teaching, or both. And given the nature of knowledge today, the commitment must be made in some substantive area. He is taking the first step into a profession. In the serious graduate school the student automatically and immediately feels this difference. He will respond to it by seeking clues about what it means now to be en route to becoming not just a student with a degree but a professionally trained political scientist, economist, philosopher, musicologist, etc. ... Second, it involves much greater specialization. Undergraduate education typically involves some concentration in a subject, but it should also permit students to range widely among disciplines. In graduate work, the central focus is a discipline, usually defined by a distinctive subject matter, a set of central questions, some common conceptual tools and research methods and some accepted criteria of validation. The discipline is probed in much greater depth. Learning involves not only understanding of the methods and findings of the past, but also development of the critical standards necessary for testing, refining and adding to the stock of knowledge and concepts for the future. Third, graduate education involves development of a special frame of mind. It involves probing the outer limits of knowledge, where there are more questions than answers, less certainty and more doubt. Therefore, graduate education must encourage students to criticize and challenge accepted methods and ideas. Herein lies the real source of creative scholarship. Great discoveries and intellectual advances have come from those who have shattered the perspective of previous scholars and have posed new questions and new ways of answering them. It is the realization that such revolutions in thought have been achieved in the past that energizes the disciplined curiosity of scholars in the present... Fourth, graduate education differs from undergraduate work in its emphasis on research: it is not enough to assimilate the learning of the past, or even to subject it to criticism... Graduate study provides the skills, methods and style of thought essential to future progress in research.

In addition, graduate students are intimately involved in research activity while still students... Career commitment, specialization, focus on a discipline development of critical and analytical abilities, and training in research thus sharply distinguish graduate from undergraduate work. They make heavy demands on students. They require a deep commitment of time and effort and the choice of a long-term orientation to scholarship, teaching and research. Similarly, graduate education makes different demands on faculty than does undergraduate teaching. Contact with students should be more frequent and more intense. Debate and dialogue and instruction by example play a greater role. Teachers must often subject themselves to the severe scrutiny of their students. The challenge of having one's work fundamentally attacked by aggressive students is one of the most exciting in academic life.⁶

2. Requirements

We will dwell in greater detail on the functions of graduate studies, especially research. The brief preceding indications enable us to infer certain requirements which the authorities responsible for graduate studies must take into consideration in their pursuit of excellence.

These studies must be both in-depth and extensive. The teacher must display scientific skills and aptitudes: advanced theoretical and methodological training in at least one discipline, creative imagination, capability for intellectual renewal, modesty, self-confidence, staunch perseverance and ability to communicate the fruit of his labor.⁷

The student will be noted for a capacity to submit to particularly rigorous professional instruction, a desire always to do better, a great deal of flexibility and initiative, a keen critical sense and a great emotional and intellectual liking for the discipline chosen.

Even with the most qualified teachers and students, graduate studies would be doomed to mediocrity if the university did not provide a favorable environment. The university is so complex that, even where human and material resources are adequate, these conditions are not always met. Since the development of graduate studies in Canada is rather recent, it is necessary to compensate for the absence of roots and traditions as well as for a certain weakness in the infrastructure (libraries, research units, scientific communication networks, etc.). An unbounded confidence in the value of graduate studies and an innate flair or experience acquired elsewhere enable the taking of proper perspective and the best possible exploitation of available resources.

Graduate studies have apparently contradictory requirements: major specialization in a discipline, extensively diversified programs and close multidisciplinary contacts in various fields that are most promising from a theoretical or practical point of view. What types of organizations encourage the proper utilization of resources? We will examine later the requirements of graduate studies under these different aspects.

3. Role of Graduate Studies in the University and in Society

The university and society must adapt, not without difficulty, to the growth requirements of graduate studies. There can be obstruction within the university by administrators as well as by students and teachers.

Administrators tend to apply to graduate studies the established criteria and procedures of the undergraduate level; in doing so, they have a false perception of the true human, financial and material requirements of these studies.

For their part, students at the master's, doctoral and postdoctoral level are not heard as much as undergraduates who are more numerous and possibly better organized. Moreover, undergraduates have considerable resources which, in principle, may be used in part at the graduate level. Their understandable demands for better instruction and more suitable teaching methods channel most energies toward undergraduate studies. It is difficult to establish a balance between the claims of undergraduate students and the necessary allocation of material and human means to graduate studies. The point of equilibrium has never been defined and graduate students have not yet become aware of their influence in the university, nor have they accurately determined their own particular needs.

Teachers, for their part, do not easily accept the demanding daily asceticism necessary for the acquisition and preservation of superior qualifications. They are faced with no firm criteria; frequent lack of preparation, inclination or ability to work at the graduate level; and the frequent absence of stimulation from colleagues, students and the broader university environment.

How adequate is the collaboration of the administration within each university and especially among the universities? Such collaboration would sanction and stimulate the already frequent contacts among teachers and students

of various disciplines or universities, and would enhance the quality of graduate studies while reducing expenditures. Yet it seems illusory to anticipate its spontaneous generalization.

There is a recognized need for better coordination and more rigorous planning of graduate studies in each institution and among the universities. The consensus disappears in defining the practical means for achieving this. For the present, universities find themselves in a state of competition that does not facilitate cooperation. There is, therefore, the growing opinion that only governments can initiate vast operations of interdisciplinary and, especially, interuniversity programming. To date, however, self-protective mechanisms have been triggered at every critical moment, in that universities have often thwarted or redirected to their own self interests the objectives of integration pursued by public authorities.

The full realization of the objectives related to graduate studies implies that members of the community at large have certain specific attitudes and perspectives, but these are far from already acquired. To promote graduate studies, the university presents to governments requirements for costly and scarce goods and services which elected officials could use to more attractive alternative political and electoral ends. Moreover, the public interest is not always compatible with the wishes of universities. There is no point in hiding the fact that, over the medium term, universities will obtain the resources they seek only if they prove conclusively that graduate studies must be given priority over other choices, such as improvements in social security benefits.

We believe that the universities can prove the remarkable usefulness of graduate studies, but that this battle, especially in the present period of economic problems and major social expectations, is far from won in advance. Those responsible for graduate education must adopt an active role in the interplay of pressures among groups competing for funds from financial sponsors. They have no prior claim on the resources they need and, like other communities, they are accountable to society; for it is society that supports graduate studies, although the direct benefits reach only a small fraction of the population, and usually not the most underprivileged.

Society's idea of the objectives of the university, especially graduate

studies, is radically different depending upon which social groups and governments are considered. The university, like so many other objects of the social dialectic, is one of the stakes in the tough struggle waged by groups and governments.

Here is what the task force at Queen's University states:

...the university has been shaped not only by the character of its surrounding society but by the international community from which it draws intellectual sustenance and to which it contributes its own ideas and graduates. As much as any other social institution and more than most, it has responded sensitively to the vast transformations that have taken place in the industrialized and developing worlds and has sought to understand, interpret and give direction to these changes. In the process it has transformed itself from Cardinal Newman's nineteenth century genteel community devoted to the transmission of knowledge and to the opening up of the critical mind, into an institution that is closely locked into the social forces and needs of contemporary society. Controversy over the purposes of the university cannot but mirror the tensions in society over the direction of social change... Canadian higher education does not stand alone, nor are decisions about our educational future made in isolation.⁸

Graduate studies have objectives which do not leave society indifferent. They increase the quantity and improve the quality of goods and services made available; they probably constitute society's main reservoir of talents and one of the surest access routes to national and international networks and decision centres. In addition, they serve economic, regional and national ends, as evidenced by the multiple influences of the largest European, American and Canadian universities. However, as a result of the magnitude of the functions carried out by the university, especially at the graduate level, governments and social groups vie with one another to derive the benefit of its services. The university faces the constant risk of listening more attentively to some than others; thus, without consciously seeking to do so, it becomes a sui generis factor in social inequalities and an ideological instrument espousing the interests of the favored group. The university may fail to translate the objectives of graduate studies into clear, operational terms, especially in a period of financial crisis and conflicts between nations and social groups. Policies and social choices could very well have a negative influence on the promotion of these studies.

These conditions have no effect on the basic goal we have set for graduate studies: the pursuit of the highest potential quality. Given the acceptance

of this basic goal, we will now examine the specific issues which universities seem to have a great deal of difficulty in defining and, particularly, adequately solving: organization of graduate studies, distinctions required between the natural and human sciences and curricula of the human sciences. Though these are specific points, they are quite important since the commitment or noncommitment of universities to excellence depends more or less on how correctly they deal with them. This will be the subject of the next three chapters.

Notes

1. For a similar point of view, see the report of the Committee of Vice-Chancellors and Principals of the United Kingdom, Post Graduate Education: Report of a Study Group, 1975. Also, Report of the President's Committee on the School of Graduate Studies, op.cit., pp. 14-17.
2. Task Force on Graduate Studies and Research in the Humanities and Social Sciences, A Commitment to Excellence (Kingston: Queen's University, 1975), pp. 4-7.
3. Studies show that the socioeconomic status of parents is a very important determining factor in the availability of postsecondary education to their children. Long before young people are of university age, barriers have been erected which impede the exercise of the democratic principle of equal educational opportunity for all. The working class makes up 55 per cent of Canada's labor force, but working-class children represent only 40 per cent of full-time university students. With regard to graduate studies, the democratic principle can be formulated as follows: individual aptitudes and motivation being equal, educational opportunity should be equal; it is nevertheless the duty of the university to determine the qualifications required, taking into account the search for quality, as well as social needs. In the best case, only a very small proportion of students go on to the graduate level. Under the present circumstances, children of parents from the lower socioeconomic categories have very slim chances of doing graduate studies. On this matter, see Secretary of State, Education Support Branch, Some Characteristics of Post-Secondary Students in Canada, (Ottawa, 1976). Also, Torsten Husen, Social Background and Educational Career (Paris: OECD, 1972), Alvin C. Eurich, Campus 1980. The Shape of the Future in American Higher Education (New York: Delacorte Press, 1968), pp. 97-115 and Michael Young, The Rise of the Meritocracy, 1870-2033 (New York: Random House, 1959). In particular, see Ontario Economic Council, Education: Issues and Alternatives (1976) and Gaétan Daoust, Paul Bélanger, L'université dans une société éducative: de l'éducation des adultes à l'éducation permanente (Montreal: Les Presses de l'Université de Montréal, 1974). In the chapter on students we discussed their socioeconomic characteristics.
4. Task Force for the Canada Council Commission on Graduate Studies in the Humanities and the Social Sciences, University of Toronto Report, Toronto, 1975 (unpublished), p. 12.
5. Graduate Studies in the University of Toronto: Report of President's Committee on the School of Graduate Studies, 1964-65, Bora Laskin, President (Toronto: University of Toronto Press, 1965), p. 30, quoted in the Report of the University of Toronto Task Force, pp. 13-14.
6. A Commitment to Excellence (Kingston: Queen's University), op.cit., pp. 14-17.

7. Creativity is the most important attribute of the scholar. See Norman W. Storer, The Social System of Science (New York: Holt, Rinehart and Winston, 1966), pp. 57-74. Creativity - that is, the ability to produce original work - is to be found in all the large schools of graduate studies.
8. A Commitment to Excellence, op.cit., p.3.

VI ORGANIZATION OF GRADUATE STUDIES

How should graduate studies be organized to meet their purposes? What should be the status of the faculty of graduate studies? How should these studies be provided by departments? What could be the role of interdisciplinary study institutes and centres? How could the university as a whole best contribute to bringing into line the various structures, some of which are designed for graduate studies only? Canadian universities have considerable difficulty in responding to these questions: incoherence is too often the rule and, even where structures appear well established, their functioning is not always harmonious and the results are sometimes disappointing.

The task force of the University of British Columbia conveys this general feeling of confusion, even disorder, in the organization of graduate studies, and it accurately outlines the situation as follows:

The institutional arrangements for graduate education at UBC, like those at most North American universities, are dominated by the fact that graduate education has been an afterthought, superimposed on institutions devoted to undergraduate education, and without much effort being made to shape those arrangements to suit the functions being performed. Rather the endeavor until recently at least, has been to shape the functions of graduate education to suit the institutional structure, with unfortunate results.

The Faculty of Graduate Studies at UBC, as in most Canadian universities in its present organization is an awkward and somewhat feebly functioning superimposition on departments whose effective ties are to the budgeting faculties. Its main duty is to coordinate the graduate education efforts of the university departments to ensure a consistent standard of quality among them by setting and administering admission requirements, course requirements and procedures. The Faculty also has the duty of ensuring fairness in the relationship between faculty member and student. Beyond these functions of registrar and policeman, the Faculty performs a modest role of encouraging the initiation of new programs, both within existing disciplines and by combining the resources of several disciplines. Those innovations which depend from the outset upon interior university budgeting rarely develop quickly. To begin anything of significance it is necessary to secure money from outside the university. Depending on the size and probable duration of the undertaking, and the combination of disciplines involved, the dean and Faculty will authorize a program within a department, or an interdisciplinary committee, institute, or centre. Initially, the cost of staff, supporting services, student support and frequently equipment and plant are largely supported by outside money, though this varies from undertaking to undertaking. If the initiative is later seen to be developing well (and methods of judging this are hardly well-defined) the dean negotiates with the university administration for 'hard' money to support staff. This is a matter of gradual assumption of the main

burden by the university, timed to be completed when the grant money runs out. The method in the case of extra-departmental or cross-disciplinary undertakings is usually to negotiate for faculty time for the operation and to return money in lieu of that time to the departments from which the research personnel came. Such allocation of time ensures maintenance of an interdisciplinary presence, though sometimes it causes trouble: discipline departments are reluctant to second personnel to other activities, even when this is fully paid for, though the possibility of bringing money into the department usually reconciles them to the sacrifice.

Indeed it is the shortage of funds, exacerbated by the fact that departmental budgets are heavily oriented to undergraduate instruction, which creates the appearance of a jurisdictional conflict between the interest of the discipline departments and those of interdisciplinary undertakings. The belief in this 'conflict' is strong among the interdisciplinary institutes who, short of funds themselves and largely dependent upon outside sources, are frequently inclined to blame departmental obscurantism for their situation. It is also reflected in an official document of the Faculty of Graduate Studies entitled A Review of Graduate Study at the University of British Columbia (Vancouver, 1966) (known as the 'Green Book'): 'Among the most important of the contributions the Faculty of Graduate Studies can bring to the university is elimination of traditional undergraduate and professional boundaries. Within its compass new alignments are fostered, disciplinary barriers should be crossed with ease and the development of new interdisciplinary areas of study is facilitated.' (Ibid, p. 3)

It should be noted that the Faculty of Graduate Studies also lacks any large independent funding.

But the conflict has no reality outside the anxiety for funds on the part of those who think themselves underprivileged. Members of the Faculty of Graduate Studies are the same people who are members of the departments. The Faculty of Graduate Studies could do nothing nor spend any money that was not approved of by the departments; and giving the Faculty of Graduate Studies money or power, as is frequently suggested by the dean, would not by itself solve the problem of ensuring adequate development of graduate education.

The real root of the problem lies in the fact that most of the financing of graduate work within the university is done through a departmental budget which is heavily oriented to undergraduate instruction. As the Green Book noted in 1966: 'It is a matter of experience...that within academic areas where undergraduate study has been the first devotion, graduate instruction frequently assumes a subordinate position. The fiction of graduate duties as an "extra" superimposed upon a heavy load of undergraduate teaching tends to persist. Little or no direct budgetary allocation is made to the support and encouragement of graduate studies.' (Ibid.)

Since professors as members of the Faculty of Graduate Studies are not functioning in an arena of real power for promoting graduate education, they (or rather the small proportion of them that take a regular interest in the affairs of the Faculty) are reduced to emphasizing and overemphasizing regulations designed to protect standards. Too frequently they have dull axioms to grind, especially in curriculum matters. Unfortunately, such bureaucratic preoccupation ensures not high standards but minimum ones. Flexibility is limited, both in the taking of new initiatives and in the administration of existing programs. No doubt distinct financing and administration of graduate

education in the humanities and social sciences at UBC would make possible more flexibility in all respects and greater likelihood of fruitful innovation.¹

The task force at Laval University comes to a similar conclusion:

The panorama of the human sciences at Laval leads us to make numerous observations. Most of these relate to the disorganized aspect of advanced studies or research. Whether the incoherence of programs or their low output, the absence of specific objectives or the dispersion of energies in too many areas, the poverty of research structures or gaps in the training framework provided students, all these deficiencies reflect a poorly structured situation characterized by indecision. And it's virtually certain that the same situation prevails in other universities since the human sciences, which constitute a fully growing sector in all universities, have not yet succeeded in clarifying their needs. There is every reason to believe that this situation will continue to exist until such time as society defines the tasks it plans to commit to historians, sociologists or philosophers and, consequently, that universities will not be able to develop programs geared to the profile of well-defined professions.²

The inconsistencies in the organization of graduate studies are due especially to the poor working links of three structures: the faculty of graduate studies, the department and multidisciplinary study institutes or centres.

The faculty of graduate studies is officially considered the centre of a complex machinery that selects the best students and attracts the best teachers. Yet this faculty has most often so little power that its action is ridiculously limited, even for concrete tasks. According to the task force at Laval University, "the Graduate School, which defines and sees itself as a branch, is in practice an ambiguous administrative structure."³

The task force at Queen's University comes to the same conclusion, which it attributes in part to the powerlessness of the deans of these faculties:

...because of the rapid expansion of graduate education, schools of graduate studies have been simply tacked on to existing undergraduate university structures. It is probably safe to say that in most Canadian universities graduate programs have evolved in response to the opportunities of the moment. As a consequence, the graduate school has tended to be regarded as a kind of poor relation, someone who must be supported by the family but is seldom consulted on family affairs. There is no clear articulation of the place of graduate studies in the university or of its priority. Few attempts have been made to gather data which could show the distribution of resources as between graduate and undergraduate instruction. As we have suggested earlier, the faculties or schools of graduate studies, and their deans, appear to have a relatively minor role in decisions about the allocation of resources, or about hiring,

promotion, tenure and the like... Many deans of graduate schools were and remain virtually impotent in the life of the institution. They have tiny budgets to administer. They play an insignificant role in decisions about hiring, promotion and tenure. Few universities seem to be interested in evaluating graduate teaching and the quality of thesis supervision. Some graduate deans and department chairmen might collect relevant data, but little of this seems to make its way effectively into the decision-making process.⁴

In most Canadian universities, the department - the basic unit of undergraduate studies - is the level at which major orientations and allocations of resources to graduate studies are decided. Even the University of Toronto, which grants a great deal of importance to multidisciplinary centres and institutes, utilizes the department as the mainspring of graduate studies:

The main work of the School of Graduate Studies has been and will continue to be in the major, existing departments such as Classics, English, History, Philosophy and Political Science, to name but five. In no small measure such departments have provided resources so strong that innovation with these resources proved to be feasible. The capacities and patterns of work in the traditional departments are well understood...⁵

According to the task force at the University of Montreal, the latter's departmental organization is particularly sound and functions quite adequately:

Though not the only factor in the development and practice of graduate studies, the department has been and remains the centre of concentration and diffusion of all the elements that contribute to the learning of a discipline and its ultimate autonomous practice. The importance of the department's role has been clearly and strongly recognized by the Academic Development Committee at the very beginning of its report on the structures of the university: "As a basic element, ...the department identifies itself first and foremost with a discipline, constitutes the basic unit of the university and is the home base of faculty. All faculty interested in teaching and research in a given discipline are located within the same department and become, in effect, responsible for the development of this discipline throughout the entire university. The department teaches a given discipline to all interested students. The notion of teaching must be taken in its broadest sense to include teaching within current and future undergraduate, master's and doctoral programs, and to extend to continuing education.

Moreover, the department is not only responsible for teaching but also research. Altogether, research and teaching in a given discipline at the undergraduate, master's and doctoral level are all under one department responsible for this discipline.

From this perspective, the department is also responsible for the orientation and progress of the studies of each student, since the department is the home port of the student enrolled in a program or specific discipline of the department." (Academic Development Committee, Structures, June 1970, pp. 10-11.)

The departments are thus given heavy responsibilities both at the level of graduate studies and research, and that of undergraduate studies. We could

even state that the other university structures exist to assist the departments in the exercise of their responsibilities. The way in which human science departments discharge their responsibilities is, therefore, the decisive factor in the development of graduate studies and research in these disciplines.⁶

Besides these numerous and universally recognized advantages, the departmental structure has two serious deficiencies with respect to graduate studies: it is primarily oriented toward the undergraduate level, and this orientation is mono-disciplinary which is, for that matter, quite easy to understand. Since it is geared to undergraduate studies, the department cannot fully and permanently meet the requirements of graduate studies. Consequently, all universities whose graduate studies are of some importance have established additional structures, institutes or centres. This has been done most often in an empirical, piecemeal fashion, as a result of emerging needs or at the initiative of teachers. These institutes or centres are attached sometimes to the faculty of graduate studies (as they are at the University of Toronto), sometimes to the council of the university through the vice-president for teaching and research (as at Laval University) or to departments. In many universities, some of these centres hire teachers, provide teaching and award university credits and diplomas. In most cases, however, they constitute a place where teachers from different departments interested in similar issues, but from the perspective of separate disciplines, can come together to conduct research.

The best centres or institutes seem to be those that provide a good framework to many competent teachers, but whose dispersion among the departments prevents any collaboration based on a stable institutionalized arrangement. Most of the task forces established by our Commission at eight universities have dwelled in depth on the advantages and disadvantages of these structures. Here are some of their observations:

One of the most remarkable developments in the Graduate School at the University of Toronto in the last 10 to 15 years has been the establishment of interdisciplinary centres and institutes. The importance of their approach to graduate studies is considerable because they cut across subject boundaries. Departmental structures, especially in the humanities, tend to reflect the historical range of a subject. The result is what might be called a vertical structure extending through time from origins to the most recent material. Such a vertical structure has many virtues: it gives an historical grasp of a subject; it is ideally arranged to show linguistic changes; it shows the influence of earlier writers on those who follow; it helps to reveal the history

of ideas, or the rise of new forms; and the list could be made longer. A limitation of these vertical structures of departments is that they go into the past like mine shafts sunk in the earth and what lies between them tends to be neglected unless horizontal development also takes place. A centre or institute is usually horizontally structured and allows the strata - to continue the mining analogy - to be followed; it encourages the development of horizons in the past and in the present. Centres do not replace departments; they are a logical, even necessary, extension from departmental work into relatively untouched material. The questions investigated tend to be fresh because they arise out of the data which can often lead, like ore veins, in unpredictable directions. One frequently hears such work described as interdisciplinary study; the word 'interdisciplinary' does not, as many mistakenly suppose, refer to the material being studied. On the contrary, it refers to the department structure of the modern university. The theory that underlies interdisciplinary centres and institutes has considerable power because it rings true to one's experience of subject matter and of universities.⁷

The traditional organization within the university responsible for graduate education has been the department specializing in a particular discipline. It is commonplace to note the emergence of a new institutional focus within the university: the centre or institute which brings together a number of different disciplines for the consideration of both old and new problems. Some of these institutes have been organized for professional or vocational training. Others seek a new focus for the traditional PhD degree.

Departmentally organized disciplines have sometimes been noted for their guild spirit and reluctance to cooperate with adjacent disciplines even when the problems to which they address themselves seem to cry out for interdisciplinary efforts. Institutes are at times the cutting edge of change for universities in that they permit new combinations of intellectual traditions and new foci for research and teaching. They may reflect new shifts taking place in intellectual life especially in those grey areas between the disciplines. Cross-disciplinary groups may encourage fresh approaches in the identification of basic problems and draw the social sciences and humanities together in new and interesting ways. They represent a major device for change in areas within which graduate teaching and research may occur.

The interdisciplinary PhD for some may serve as the cutting edge of change. But the mining of the disciplines may also add flexibility to higher education in a very different way. The growth of various combinations of the social sciences and humanities in vocationally oriented programs, for example, permits the university to demonstrate the degree to which its knowledge may have some significance for the solution of social problems.

Policy analysis institutes, planning centres, institutes for the study of poverty, centres for urban study and the like often represent efforts to create for the social sciences schools of applied science corresponding to the professional schools of the natural sciences. Earlier we spoke about the vocational pressures of the integrity of the PhD as a research and teaching degree. Here we wish to stress the positive aspects of these efforts by the university to apply its social and humanistic knowledge for social purposes. If we now consider these interdisciplinary centres as the emerging professional schools of the social sciences and humanities, where they are effectively organized and seek to retain a high level of professional competence in their staff and

curriculum, they can make useful additions to the intellectual life of the university.

Interdisciplinary institutes of this kind need not be competitive with the basic disciplines - especially if they can offer professional rather than PhD degrees - except insofar as they may draw off the vocationally oriented student. But this is surely desirable since it keeps him within the university and thereby provides him with the opportunity of attaining a relatively high level of competence. It behooves the basic disciplines to devise ways in which they can shore up the quality of offerings in such professional institutes, much as they have sought to do in the best graduate schools in other countries. For the schools of law, business and public administration, "The challenge of the next decade", it has been said, "will be in finding ways to preserve this primary focus on basic research while at the same time introducing concern and respect for the intellectual challenge of application, and in establishing an environment in which application stimulates basic research and scholarship".

Although often seen as useful for these two purposes - as new foci for the PhD itself or as recombinations of knowledge for applied goals - interdisciplinary centres may, however, in some forms be inimical to effective graduate education. Education at this level requires the development of certain skills: training in a well-defined and well-established method, language and set of concepts; the acquisition of acceptable standards of validation and assessment; the development of an ability to criticize, synthesize and conceptualize; and the learning of well-honed research skills in depth. Experience indicates that the attainment of these goals requires systematic immersion within a discipline.

Furthermore, the central significance of the disciplines lies in their theoretical development. Through trial and error over long periods of time they have defined the basic elements of the problems with which they are concerned. For better or worse they have identified central issues that require investigation, and although the definition of these issues may periodically undergo what have been called scientific or conceptual revolutions, qualitatively the new problems are of the same kind, namely, fundamental in character.

To place this emphasis on the disciplines in no way detracts from the potential effectiveness of interdisciplinary research programs for the PhD. It is rather a warning that an interdisciplinary approach has no particular merit in and of itself. In fact it may even be destructive of effective graduate education and research if it consists simply of an ill-conceived hodgepodge of courses put together because of the dubious appeal of breadth of training for its own sake or because of topical vocational interest in an area.⁸

... At present, departments are suited to meeting the needs of the unique and individual researcher, supported by individual grants and attracting his own personal following of students. But research, and with it graduate education, is growing beyond this individual approach. Increasingly in the social sciences (and in some cases of large undertakings in the humanities as well) researchers find it desirable, if not essential, to group with people of like interests. Such groupings within departments or combining researchers from various departments are the basis for research programs and, to administer them, of research institutes. Smaller, and less burdened with bureaucracy than are departments, these institutes could more efficiently and fruitfully supervise research and graduate education. The group of people doing the research and training the graduate students would thus be the people making

the decisions, brought together in mutually-comprehending and intellectually-related groups.

Research institutes would provide centres for research facilities including stenographic services devoted to research and graduate education, statistical and survey research facilities, equipment and specialized accommodation. They can provide a basis for secondment of research faculty, part-time and full-time, from the departments and visiting faculty, as well as for research chairs and postdoctoral fellowships. Such research personnel would more appropriately be based in a research organization than in an undergraduate-oriented department.

The institute organization would also provide centres for multidisciplinary research, including mission-oriented work undertaken for governments and private agencies. Indeed such an organization could be the base not only for providing research advice to governments, but for doing the research itself, since it would be able to accumulate the facilities which governments and private agencies might not have. As a training organization the institute would be educating students in the specialized skills increasingly needed by the public.

... One important advantage of the institute organization's capacity to gather researchers together is that in the very gathering they become the appropriate repository for funds from national public and private agencies. Large-scale research undertakings (the Institute of Survey Research at York University) tend to become the magnet for national funds, and a basis for whatever 'rationalization' of research undertakings on a national scale that national bodies may be disposed to undertake. Thus, the location of particular research institutes determines the location of funds, research chairs and visiting personnel. They become centres of excellence on the model suggested by the Bonneau-Corry report. More importantly, they become the appropriate agencies for administering joint funding from a variety of agencies - a type of funding much to be desired in view of the increasing centralization and direction of federal government support. They also provide the administrative centre for travel and maintenance grants for students and professors travelling abroad for their research and for the sustained support of graduate students under their supervision. Perhaps most convenient of all, in the light of the need to secure more faculty time and at the same time to placate the departments, they provide a way of bringing money into departments without tying them to the necessity of increasing undergraduate enrolments to secure it.⁹

On this point, we have purposely and extensively called upon our collaborators who, as a result of their functions, were able to assess all the aspects of the soundness and usefulness of graduate studies. The conclusion is significant: this organization is lacking everywhere, and it is unanimously criticized. However, there are very few concrete proposals for reform resulting from these observations and views. Moreover, one could be tempted to solve the problem by mentally suppressing it - an attitude that has become quite common in universities. "After all," some say, "only people count, not structures. And structural reform projects generally lead to 'structuritis'.

In short, nothing has been resolved and there has been a waste of time." While there is some truth in these arguments, we consider the deficiencies in the present case as having too many serious implications to be left to empirical adjustments in the hope that the situation will correct itself.

We have not discovered any magic formula to improve the situation, but we consider the organizational deficiencies sufficiently serious that the constant growth of graduate studies should be slowed if not prevented. In the absence of a ready-made solution, we will initiate the urgently required discussion on the pathways of reform.

The deficiencies in the present organization of graduate studies are often imputed to the latter's growth during the last decade. Not generally mentioned are the three following facts: the growth of universities was first achieved at the undergraduate level; for a certain period of time, the proportion of graduate students did not rise but actually declined; finally, their proportion has only slightly increased, even over the last few years. Consequently, administrators and teachers continue to be mainly preoccupied with the numerous problems resulting from the tremendous and recent quantitative growth of undergraduate studies. It is only in the last four or five years that graduate students and teachers most interested in graduate studies and research have begun to be heard. Furthermore, the fundamental reason for the poor organization of graduate studies is to be found less in the growth of graduate studies than in the lack of awareness of this growth. All those seriously interested in the development of these studies must, as soon as possible, become conscious of the seriousness of the situation. Otherwise, graduate studies are in danger of stagnating and perhaps even, especially in the case of research, separating from universities in favor of other institutions - for example, autonomous scientific institutes (as in France).

It would be illusory to seek an independent status for graduate studies in universities. The establishment of separate structures with virtually no organic link between the undergraduate and graduate level would result in transformations that would certainly create insurmountable teaching and administrative problems, as well as inordinate increases in expenditures in relation to the results achieved.

Where must we seek promising adjustments if not in an independent status

for graduate studies? From an administrative and teaching point of view, it would be useful to establish criteria showing expenditures and output of necessary resources for graduate studies. It would then become possible to define the point of equilibrium between the efforts extended at the undergraduate level and those that benefit the graduate level. Thus it would be possible to measure the effort that universities are prepared to make to develop these studies.

Because of the limited financial means and to avoid needless malaise in the universities, the necessary reform should be carried out within the framework of existing structures: department, centre of graduate studies and faculty of graduate studies. Numerous rearrangements of competencies among these teaching and administrative units, conceived in pursuit of excellence, would provide at least temporarily the dynamism which is presently lacking in these studies.

The necessary resources for graduate studies are concentrated in the department: credits, teachers and infrastructure. The department represents a central structure in the university for the training of students and teachers, and perhaps more so for the advancement of scientific disciplines; it must therefore be examined in relation to graduate studies. Experience shows that the department alone cannot cope with this dual task. If its responsibilities are extended to include graduate work, its proper functioning at the undergraduate level, which is its primary *raison d'être*, may be affected. Some universities seek to increase the statutory powers of the departmental committee on graduate studies: extend the prerogatives of the director of this committee and regroup teachers interested in graduate studies and research into a central training source for graduate students similar to the undergraduate department. The relations of these departmental committees with institutes of graduate studies and the faculty of graduate studies must be made explicit and institutionalized to achieve the desired results. Thus, the extra-departmental links of teachers would become organic and would be within one or more departments, which would help enhance the value of the latter in the eyes of teacher-researchers.

Our collaborators have indicated that the needs which these institutes or centres are attempting to serve are essential and extensive. As

central places for the best teachers interested in multidisciplinary issues, and depending on whether they meet expectations, these institutions will determine more than any other factor whether a given university will gain recognition in specific sectors of scientific knowledge.

At the same time, with the current state of development of our universities, we are far from being able to decide on institutionalization and ensuing responsibilities. For example, must these centres or institutes provide teaching, award university credits and diplomas, be granted university budgets and outside funds which they would administer for research and many other uses (salaries of teachers and assistants, training of researchers, organization of scientific conferences and allowances for attendance at conferences)? Must they have a certain number of permanent or temporary teachers, fully or partly detached from the departments, etc.?

Though these institutes or centres are now essential organizations, they entail certain inherent risks in that they exist of necessity and are thus often established empirically without regard to the way in which they will carry out their specific duties or to the links, official or otherwise, between themselves and the other university structures, especially departments. Consequently, they often become conflict structures serving vague interests, and in a sense, the "empires" of individuals more eager for personal prestige than science. We would call attention here to the following observations of the task force at Queen's University:

Whatever the merits of a particular case, by virtue of the fact that institutes and centres divert resources and faculty away from departments, a university needs to exercise the highest wisdom and greatest self-restraint in allocating its scarce funds for these purposes. The same constraints hold for the Canada Council. Our basic apprehension is that institutes and centres, whether for professional purposes or for a research PhD, may often be grafted onto universities not as a result of clear educational decisions made by the university and its faculty, but because of aggressive initiatives of individual persons or outside agencies. To the extent that an excessive proportion of a faculty becomes involved in such ventures, the tail may end up wagging the dog, and in the case of institutes, graduate education and the teaching role of the university in general are likely to find themselves at the bottom of their list of concerns.

To protect the university from these real dangers, means need to be devised for the continuous objective reassessment of interdisciplinary teaching and research programs, whatever their institutional structure. Provision should be made for their automatic termination after a specified number of years unless after thorough review, by outside as well as internal assessors,

positive approval is given for their continuance. After two or more renewals we could assume that such interdisciplinary efforts had probably attained the status of a new and permanent discipline or professional school as the case may be.¹⁰

The faculty of graduate studies should be the consolidating body of these studies, which is usually accepted in principle.

However, this faculty does not have the required elements of support, and its dean possesses few personal, material and symbolic resources; in the present circumstances, he hardly needs them since he is given few responsibilities.

In our opinion, the teaching and administrative inadequacies of the faculty of graduate studies are the major stumbling block of the entire current organization of these studies. Any coherent reform of the structures would presuppose that these inadequacies are dealt with in the first instance. The faculty should place much less emphasis on routine administrative tasks that now comprise so much of its work; though not acting as a parallel university within the university, it should exercise real orientation and control functions: control of certain resources, right to sanction the specific activities of graduate studies, teaching and research, as well as all the teaching and administrative structures. These structures are the departmental committees on graduate studies which often flout the regulations and sanctions of the faculty by taking upon themselves the administration and organization of the department, or again the centres or institutes of graduate studies which, for their part, are often answerable only to whatever administration they give themselves.

There is a specific question we cannot settle but which the follow-up to this report will implicitly raise: can a true reform of the faculty of graduate studies be carried out with the latter as the sole structure? Following an in-depth reorganization of these studies, would not the roles assigned to this faculty rather call for an organization with two sections, one responsible for natural and health sciences and the other for the human sciences as a whole? Many factors that are a source of conflict and incompatibility and that too often cripple the faculties of graduate studies would disappear. On the other hand, it would be necessary to examine closely the problems arising from this reorganization.¹¹

Notes

1. Task Force for the Canada Council Commission on Graduate Studies in the Humanities and the Social Sciences, the University of British Columbia Report, Vancouver, 1975 (unpublished), pp. 24-28.
2. Task Force for the Canada Council Commission on Graduate Studies in the Humanities and the Social Sciences, Laval University Report, Quebec City, 1975, p. 51.
3. Ibid., p. 8.
4. Task Force on Graduate Studies and Research in the Humanities and the Social Sciences, Queen's University, A Commitment to Excellence, Kingston, Ontario, 1975, p. 28, pp. 6-7. This observation made by the Queen's Task Force is very similar to the opinion expressed by Roy Nichols, a dean himself at the time, quoted by Bernard Berelson in Graduate Education in the United States, op. cit., p. 119.

"The graduate dean (is) in an anomalous position. In terms of the usual connotation of the word, he is not a dean at all. He has faculty, to be sure, but he does not recruit it, pay it, or promote it. He cannot effectively either reward or admonish it. He cannot deal effectively with department heads in a direct face-to-face relationship in any realistic atmosphere of academic negotiation. The department heads know, and he knows, that they must look to other deans for new appointments, promotions, increases of salary; they must negotiate elsewhere than in his office... In fact, it seems only too apparent that the graduate dean can, in certain instances, be described as little more than a registrar and student counselor. Yet he and his part-time associates are responsible for the highest quality of the university instruction and for the carrying out of some of the most difficult objectives of higher education."
5. Task Force for the Canada Council Commission on Graduate Studies in the Humanities and the Social Sciences, University of Toronto Report, Toronto, 1975 (unpublished), p. 30: also Report of the President's Committee on the School of Graduate Studies, op. cit., pp. 62-69.
6. Task Force for the Canada Council Commission on Graduate Studies in the Humanities and the Social Sciences, University of Montreal Report, Montreal, 1975, pp. 74-75.
7. Report of the University of Toronto Task Force, pp. 27-29.
8. A Commitment to Excellence, op. cit., pp 29-32.
9. Report of the University of British Columbia Task Force, pp. 28-31.
10. A Commitment to Excellence, op. cit., p. 32.
11. On this subject, see the Report of the President's Committee on the School of Graduate Studies, op. cit., pp. 18-22.

VII HUMANITIES AND SOCIAL SCIENCES AMONG GRADUATE STUDIES

Graduate studies are very far from constituting a homogeneous field. It is from the vague perspective of the human sciences that the areas grouped under the convenient terms of natural sciences and health sciences form a specific whole. There are fundamental differences in orientation and methodology between the latter. In view of the objectives pursued here - to point out very generally the basic differences and similarities between these major fields of knowledge - it is useless to determine contrasts, even if only in the natural sciences, and not speak of what distinguishes them from the health sciences. Similarly, the term "human sciences" covers fields quite different from one another, such as law, economics, linguistics and French, English or other literature. Also included are fields of study from other disciplines which sometimes meet the criteria of the natural or health sciences as well as the human sciences, such as psychology, geography and administrative studies.

The term "human sciences" is equivocal since it covers the social sciences and the humanities. There are many "border" or "crossroad" disciplines, such as history, religious studies and education, which may be classified as easily in the social sciences as the humanities. The term "human sciences", as used here, is far from having acquired a precise meaning, accepted through usage and university practices.

Task forces, particularly those at Laval University and the University of Montreal, have advised us that the use of this term could have unfortunate results, even with respect to the appropriate combination and interpretation of statistical data. The task force at the University of Toronto felt justified in establishing essential differences between the social sciences and the humanities: the scope of the former would be limited to a number of "tangible" and "practical" realities, while the latter would extend to "intangible values" and the area of the "inner life of the spirit".¹

We prefer, for practical reasons, to retain the term "human sciences" to cover both social sciences and the humanities; however, we will make specific distinctions between these two sectors, even within one or the other, each time this is warranted. We have included the same disciplines as the Canada Council in our definition of the human sciences, except that we have excluded

fine arts and mathematics. With a few exceptions, such as history and linguistics, we have followed Statistics Canada definitions on the composition of the humanities and social sciences. The following disciplines of study will be considered as humanities: archaeology, classics, history, English, French, other modern languages, linguistics, philosophy and religious studies. The following fields of study will be considered as social sciences: administrative studies, anthropology, communications, economics, education, geography, interdisciplinary studies, law, political science, psychology, social work and sociology.²

The disciplines grouped under the term "human sciences" were long considered as nonscientific. The Saint-Paul-de-Vence conference in June 1972 had no representatives from the human sciences even though its theme was the relationship of science with society. No answer was given why the organizers had invited only "scientists." Though only among "scientists," the discussions at the conference showed clearly the following point: when modern-day problems are dealt with scientifically, the personal ideologies of researchers cannot be ignored since they have infiltrated the natural sciences themselves. Thus, at the outset of the working meetings, the pre-established groups were dissolved and new groups formed according to the ideological orientations of the participants: some adhered to traditional "liberal" concepts and others to the so-called "critical" science, generally of the marxist tradition, though the latter were not the only ones sharing those views. At the same time, the discussions brought out the inability of these scientists to adequately determine value and ideological issues. Briefly, the exchanges among participants on the relations between the social sciences and exact sciences were quite indicative of the state of mind of these "scientists." One participant stated that the "hard sciences" are actually ideology-free as opposed to the social sciences; he considered "it would be useful to introduce scientists to sociology at the end of their studies." Someone challenged him for exaggerating "the difference between natural sciences and social sciences" and added, "the problems of cancer and the environment are so complex that they exceed the boundaries of a single discipline." A third participant asserted, "instead of teaching social sciences to researchers in the exact sciences, why not do the opposite?"³

Specialists in both the natural and human sciences will most often consider their sciences to be scientific when they base themselves on the model of the exact sciences. We will return to this basic point concerning research in the human sciences. Only a few general observations are required here.

Like many others, we are conscious of the theoretical and methodological weaknesses of the human sciences, as well as of the enormous difficulties they will have to overcome to grow according to their own requirements. However, we would be deluding ourselves if we thought the human sciences had only to follow in the footsteps of the natural sciences in the hope of filling the gaps long and generally recognized. The theoretical and methodological homogeneity of even the so-called, pure, natural sciences is rarely attributed. In particular, many of these disciplines are less subject to the sole processes of quantitative measurement than is generally considered, and the notion of quantitative measurement is far from being unequivocal. The human sciences may have as much to learn, if not more, from the way in which work is carried out in the clinical disciplines or engineering rather than physics. Finally, the relationship between the human sciences and values is much closer and more direct than is the case in natural sciences; the development of the human sciences and their operational evolution are greatly influenced in this sense.

Of the many problems raised but far from being solved, two deserve particular attention: the "generality" often required of the human sciences because of the dependence of researchers on the natural science model, and the effects that necessarily follow the conception and orientation of the development of the human sciences, in view of their particular relation to values.

The need for "generality" in the social sciences has been clearly stated by Joseph Ben-David:

The reason for misunderstandings concerning social science research is that social scientists formed their conception of natural science on the basis of the descriptions of philosophers of science or of philosophically inclined scientists. These descriptions are not necessarily inaccurate, but they are selective. On the basis of these descriptions it is, perhaps, justifiable to identify science with physics. That discipline comes closer than any other to producing very general, yet precise and testable theories; it can, therefore, be considered the clearest example of what scientific thought is, in principle, capable of accomplishing. Consequently, social science, this most recent of all the sciences, which deals with phenomena of the greatest complexity, tries to model itself on the oldest of the natural sciences,

physics, which deals with phenomena of the least complexity. The worst effects of this misunderstanding can be discerned in so-called social science theory. There is an assumption that social science theory has to have a very high degree of generality, like, presumably, physics theory. Since to aspire to such generality is completely out of tune with the empirical inquiries of social scientists, what actually happens is that social scientists present empirical approaches as if they were general theories... But because sociologists are trying to follow the model of the basic natural sciences they tend to force problems into disciplinary frameworks and to treat them according to their relevance to some theory as if the purpose of the investigation were to test hypotheses. The results are usually trivial from the point of view of theory and much too abstract to be useful in practice... Therefore basic research in social science is something vague and variable. There is no single basic science, and what is considered as the most important of the several basic sciences in a given field changes often, like fashion...

And Joseph Ben-David continues:

According to my analysis, one of the principal problems in social science is this lack of recognition that many of the questions investigated by social scientists require an eclectic approach like that of clinical medicine or engineering... Recently there has been a change of attitude toward science and now the model of applied science is favored over that of basic science... Before they can organize their research, social scientists must address themselves to the question of whether the aim of their research is, on the one hand, to establish generally valid rules or principles, or, on the other hand, to explain particular events with the aid of general principles. If it is the latter, as I maintain it very often is, then this kind of research is in its logical structure a clinical-engineering type research whether its findings are ever practically applied or not... However, social scientists do not accept this model as suitable for their research. This is because, on the whole, social science has been used for the diffuse purpose of 'enlightenment'; namely for the interpreting of social situations and social objectives rather than for formulating detailed strategies for the attainment of those objectives... although social scientists are rarely in charge of action programs, their work has become an integral part of social therapy and social engineering designs.⁴

This lengthy quotation shows quite clearly that there are many scientific "models," and that the choice of one or other of these models, far from depending on how to make the human sciences "scientific," results as much from the conception of the nature and role of these sciences. For the time being, it is unnecessary to reach a decision on this issue; it seems however - and we will show this later - that the clinical-engineering model lends itself better to the pursuit of certain objectives in the human sciences than does the physical science model.

Another condition of the human sciences leads us to believe that their own

scientific status will not be enhanced by servilely following the natural science model. In our opinion, no science is completely free of ideology, but the human sciences are so closely linked to values that it would be impossible for them not to take up the ideology challenge.⁵ Any methodology geared to the human sciences will be qualitative as well as quantitative and will retain the critical aspect of these sciences. One last point: the recent interest in the human sciences results a good deal from two facts: scientific research takes much more into account the social and human variables and, as research becomes more multidisciplinary, it connects the human sciences much more closely to the natural sciences. The former, whose theories and methods are not as well structured as the latter, could find themselves only in an auxiliary role, which would be an additional factor restraining their development.

Each day we become more conscious that the human sciences greatly need precise theoretical and conceptual frameworks as well as rigorously scientific methodologies. However dramatic the stakes may be at this time, researchers must not overlook their first responsibility: the formulation of theories and methodologies with a view to discovering new knowledge. University teachers and administrators must realize, however, that the human sciences will not progress if they are left to trail behind the natural sciences, and more particularly physics, even if the search for a model suited to these sciences must entail temporary incoherence and tension within the university. Time presses for researchers in the human sciences to define the most favorable criteria for developing knowledge in the direction that is appropriate to these disciplines.

Notes

1. For a similar point of view, see M.A. Fitzsimons, "The Humanities and Education for Humanity", in Stepehn D. Kertesz, ed., The Task of the Universities in a Changing World, (University of Notre Drame Press, 1971), p. 23.
2. The list of social science subjects established by the Canada Council is very similar to the one given by J.D. Bernal in Science in History. The second list does not include interdisciplinary studies and communications, but it mentions philosophy and religious studies, whereas the Canada Council does not. J.D. Bernal, Science in History, 4 vols. (Cambridge, Mass.: MIT Press, 1971), vol. 4; The Social Sciences: Conclusion.
3. "Science et Société: Le colloque de Saint-Paul-de-Vence", Le progrès scientifique, no. 160 (Jan. 1973), pp. 60-61. The participants were, in order, M. Fiebigier, W. Krohn and B. Uvnas.
4. Joseph Ben-David, "How to Organize Research in the Social Sciences", Daedalus (spring 1973), p. 39, pp. 41-42.
5. Report of the University of Toronto Task Force, pp. 8-11. Also, Paul Starr, "The Edge of Social Science", Harvard Educational Review, vol. 44, no. 4 (1974), pp. 393-416; Albert William Levi, Humanism and Politics. Studies in the Relationship of Power and Value in the Western Tradition (Bloomington, Indiana: Indiana University Press, 1964), pp. 6-19; Herbert Jacob, "Some Consequences of the Development of Scientific Social Sciences", in Stephen D. Kertesz, ed., The Task of the Universities in a Changing World.

VIII GRADUATE PROGRAMS IN THE HUMAN SCIENCES

The briefs presented, the reports of our task forces and our disciplinary studies have all examined graduate programs in depth. We will consider here the main ideas of our collaborators who, on the whole, agreed and expressed views close to our own thoughts and conclusions.

We deem it useful, in the first instance, to reexamine briefly the objectives of graduate studies. We will then deal with the content of current programs and discuss the requirements at each level of higher education. We will conclude this section with brief remarks on the length of graduate studies and on continuing education.

1. Objectives of Graduate Studies

Any useful discussion of graduate programs in the human sciences must be related to their objectives. Since we have already dealt with these objectives, only a brief review is necessary here.

The primary objective of graduate studies is the pursuit of excellence which makes very large demands on teachers and students: demands concerning career, specialization by discipline, acquisition of exceptional analytical and critical skills and, at the doctoral level, manifest aptitudes for research.

Many indicators must be used to assess the quality of an institution: number, qualifications and published works of teachers; number of graduate programs and students; percentage of these students in relation to the overall student population; proportion of programs and students at the master's level in relation to those at the doctoral level; size of the library and laboratories; and amount of research funds available.¹ We have already determined a certain number of these quality indicators and will suggest others later on.

We are faced here with two problems in connection with programs. Since the available indicators are essentially quantitative, who will be responsible for assessing the quality and future prospects of graduate studies in each university, and based on what criteria?

Only teachers who are competent and not directly involved are in a position to judge impartially the quality of the graduate studies of each institution,

taking into account the increasing integration of universities in provincial systems. The Advisory Committee on Academic Planning (ACAP) of Ontario and the so-called major "operations" committees established in Quebec, notwithstanding possible errors of judgment, remain the only way of ensuring the safeguard of education and scientific standards.

The method of assessment would be more accurate if, instead of being limited to an analysis by discipline or small groups of disciplines, it were based at the same time on more general criteria bearing on the educational resources and infrastructure of a university or region. We will deal later on with libraries, facilities for the sole purpose of research, specialized journals, scientific communication networks and other aspects of the infrastructure. The following are a few data on programs and students.

The presence of a critical mass and proportion of students at the master's and doctoral level is a good indicator of the quality to which a university may lay claim.² We can arbitrarily set at no less than 2,000, 1,500, 1,000, 500, etc., the number of graduate students, and between 15 and 20 per cent, 10 and 15 per cent or 5 and 10 per cent their proportion among all students as a whole. We may limit ourselves to full-time students or we may add part-time students converted to full-time students (the standard is three part-time students equal one full-time student). We felt that this last method would provide a more accurate and realistic picture than if we considered only full-time students. (The differences, however, are minimal for the last five years of our data, as shown in Appendices III, 10 - 10.6.)

Canadian universities are distributed into four categories according to our double criteria, namely the size and proportion of graduate enrolment (Table 1).

Four universities - McGill, Montreal, Toronto and British Columbia - are ranked in the first category. Each of them has at least 2,000 students enrolled in graduate studies, and the latter account for at least 15 per cent of total university enrolment. (The proportion at the University of British Columbia, however, reaches only 12.2%.) According to these indicators as well as most of the others used in our report, the University of Toronto is in a class by itself. It exceeds by 40 to more than 50 per cent each of the three other universities for the number of students enrolled in undergraduate and graduate studies.

Table 1

Size and Proportion of Graduate Enrolment at Selected Canadian Universities, 1974-75

Adjusted Graduate Enrolment	Adjusted Graduate Enrolment as Per Cent of Total Adjusted University Enrolment:			No.
	15% or more	10-14.9%	5-9.9%	
2,000 or more	McGill Montreal Toronto	British Columbia		4
1,500-1,999		Alberta Laval Ottawa Western Ontario		4
1,000-1,499		McMaster Manitoba Queen's Waterloo	York	5
500-999	Sherbrooke	Carleton Dalhousie Simon Fraser	Calgary Concordia Guelph Memorial Quebec Saskatchewan Windsor	11
100-499			Moncton New Brunswick Regina Sir Wilfrid Laurier	5
99 or less			Nova Scotia Technical College Bishop's Brock Laurentian St. Francis Xavier St. Mary's Trent	7
No.	4	12	13	36

Source: See Appendix III, 10.6.

Eight universities - nine, if York is included - fall into the second category based on the size and proportion of graduate enrolment. They are the universities of Alberta, Laval, Ottawa, Western Ontario, McMaster, Manitoba, Queen's and Waterloo. Each of these institutions has between 1,000 and 1,499 graduate students, and this enrolment accounts for 10 to 15 per cent of the university's total enrolment. York may be added to these eight universities with, in 1974-75, 1,416 graduate students, or 9 per cent of total university enrolment. The rapid growth of graduate studies over the last few years in this young institution leads us to believe it will soon exceed the 10 per cent level.

The third category is composed of 11 universities. These have between 500 and 999 graduate students, their percentages in relation to total university enrolment being 18.8 for Sherbrooke (which is exceeded on this point only by McGill); between 10 and 14.9 per cent for Carleton, Dalhousie and Simon Fraser; and between 5 and 9.9 per cent for the universities of Calgary, Concordia, Guelph, Memorial, Quebec, Saskatchewan and Windsor.

Finally, there are 12 universities in the fourth category: Moncton, New Brunswick, Regina, Sir Wilfrid Laurier, Victoria, Nova Scotia Technical College, Bishop's, Brock, Laurentian, St. Francis Xavier, St. Mary's and Trent. These universities have fewer than 500 students enrolled in graduate studies; the graduate students in five of them account for less than 10 per cent of all students, and in the seven others for less than 4.9 per cent.

According to our two criteria, no more than 13 universities of a total of 36 offering both graduate and undergraduate studies may be considered as placing a good deal of emphasis on the latter. Most of the remaining 11 universities offering graduate programs are specialized institutions. At most, we could add the four universities with 500 to 999 graduate students, accounting for 10 to 14.9 per cent of all students, bringing this total to 17. (Use of the other indicators would show this to be the maximum number of institutions with such an emphasis.)

We could also determine the extent of graduate studies in each university by considering only the human sciences, which would lead to the correlative reduction of the criterion of absolute numbers. There would result few changes

in the grouping of universities according to our four categories. McGill could come down somewhat, as would McMaster, Manitoba, Waterloo, Sherbrooke and Guelph. In the last, natural and health sciences largely predominate over the human sciences. There seems to exist overall a close correlation between the development of natural sciences in a university and that of the human sciences.

Using as a criterion the extent of programs in the disciplines of the human sciences, as we have seen, out of 47 universities offering a certain number of graduate programs in 1974-75, only the University of Toronto had programs in all 21 of these disciplines at the doctoral and master's level, and five universities, namely Alberta, British Columbia, Laval, McGill and Montreal, offered programs in at least 15 disciplines at the doctoral level and 19 at the master's level. No more than four other universities, namely McMaster, Ottawa, Simon Fraser and Western Ontario, had at least 10 doctoral and 15 master's programs. Seven other universities - Calgary, Dalhousie, Manitoba, Queen's, Saskatchewan, Waterloo and York - offered at least five doctoral and 10 master's programs (Queen's had nine at the master's level.) Ten universities had at least one doctoral and 10 master's programs, namely Carleton, Concordia, Memorial, New Brunswick, Regina, Sherbrooke, Victoria and Windsor. Finally, two universities, Guelph and Quebec, had at least one doctoral and nine master's programs (Table 2).

In short, according to whether we lower or raise the criteria, we obtain a minimum of four universities and a maximum of 17 that may be considered, though to three greatly varying degrees, as having a sufficiently high number and proportion of students or as offering enough programs to justify their claim of true quality. More refined criteria could result in a modification of this finding. Any potential adjustments would, however, be minor. Some universities have unquestionably a very small number of students and offer a limited choice of programs, but they have enough good teachers and students to make possible the existence of a few quality programs. These institutions are able to overcome the handicap of limited size and must, of course, be encouraged. Other universities, like York and Quebec, still not well developed in view of their recent establishment, are expected to compare with the best if we are to judge by their current rate of growth.

Table 2
Number of Master's and Doctoral Programs by Universities

Doctoral Programs	Master's Programs	15-20	10-14	1-9	No.
21	Toronto				1
15-20		Alberta British Columbia Laval McGill Montreal			5
10-14			McMaster Ottawa Simon Fraser Western Ontario		4
5-9			Calgary Dalhousie Manitoba Queen's Saskatchewan Waterloo	York	7
1-4			Carleton Concordia Memorial New Brunswick Regina Sherbrooke Victoria Windsor	Quebec Guelph	10
No.	1	5	18	3	

Source: Appendix III, 2 and 2.1.

The quantitative differences among the three categories of universities reflect qualitative differentials. It is only by considering a series of other indicators - number of master's and doctoral programs, size of library, amount of research funds, number of degrees awarded annually, etc. - that this statement could be verified. On the whole, we find the same universities mentioned before ranked first. The same applies to our three other categories of universities.³

The individual disciplines are very unequally distributed among studies at the master's and doctoral level. Psychology, history, English, economics, philosophy, political science, geography and sociology head the list in descending order; while linguistics, law, administrative studies, archaeology, social work and communication studies are at the lower end of the list. Education studies, French, other modern languages, interdisciplinary studies, religious studies, anthropology and classics are in the middle of the list. It would be informative to know whether there exists a correlation between the rank of a discipline, as based on the frequency of studies at the doctoral and master's level, and the output of this discipline. Later on we will take into account certain data pertaining to the number of doctorates awarded by discipline.

Though the criterion of relevance is distinct from the objective of excellence, it is linked from some points of view. This must be taken into account. The criterion of relevance must be considered, in teaching and research, in terms of social usefulness. We have already dealt with the relevance of graduate studies and will come back to this. The incompatibilities seen by some between the pursuit of quality and of social usefulness are not obvious, especially if we accept the idea that social science theory and methodology would benefit from drawing nearer to the clinical disciplines and engineering rather than the pure natural sciences, like physics, and if we include the idea of relevance in the formulation of the objectives of the human sciences, instead of having it decided in practice by external agents (civil servants, sponsors, etc.). The orientations of scientific research will determine the relation between the objective of quality and that of relevance.⁴

2. Program Content

The proper organization of graduate studies is essential, but it is the intrinsic value of the programs and not the structures which determines, in the final analysis, the quality of these studies.

What is the state of graduate programs in the human sciences? We would like to be reassuring and report that they are excellent. But we must conclude from our findings that many rearrangements are necessary to bring the content of these programs to the level expected in a country like Canada.

The disappointing level of development results not only from the practices of Canadian universities but from the present unsatisfactory state of the human sciences as scientific disciplines. Neither the social sciences nor the humanities as an aggregate of disciplines, nor most of these disciplines considered individually, comprise a sufficiently rigorous and coherent body of theory and methodology to compel recognition from all the specialists concerned. In nearly every program, there are no subjects considered indispensable for the pursuit of graduate studies, or even for the obtaining of a master's or doctoral degree. In numerous cases, doctoral studies do not constitute a homogeneous aggregate of courses. Except for the special seminar which doctoral students must follow when in sufficient numbers, most courses are either master's courses or so-called research or reading courses which they follow individually after consultation with the teacher and authorization from the departmental committee of the faculty of graduate studies. To use the terms of the task forces who examined this question, graduate programs in the human sciences are extremely fluid and incoherent. Even the distinctions in principle which we have established between undergraduate and graduate programs are far from being respected. The acute needs of the former often cause departments not to give the required attention to graduate programs. The practice of having students from the master's and even doctoral level follow undergraduate courses is being progressively abandoned, except when a student has to make up certain courses; however, in a good many cases, programs at the master's level may be considered a mere extension of those of the undergraduate level. It is deplorable that the authorities, apparently yielding to administrative pressures, think more in terms of increasing than improving programs and that available resources are consequently dispersed.

The following is from the authors of the report of the task force at the University of Montreal, who accurately summarize the views of our collaborators:

Those who direct graduate programs in the human sciences should, in our estimation, also be concerned about the dispersal and piecemealing of these programs. The dispersal of program courses and of the research work of faculty and students results in large part from the empirical evolution of graduate programs until very recently. We could simplify things somewhat by perhaps stating that the objective pursued had been to include in graduate programs the largest possible number of courses of a given discipline, taking into account the available resources. Consequently, many graduate programs have ended in a juxtaposition of elements contributing to a graduate education rather than in the overall coordination of these elements. Determination and efforts may be very intensive; however, because these efforts are not related to orientations coming from departmental integration and choices, they have but a limited impact on the development of graduate studies in the disciplines concerned.

In the course of interviews, we found that some social science departments have become aware of the fact that in order to develop graduate studies they must concert their resources and efforts to achieve a better integration of teaching as well as faculty and student research. In other words, there is a growing awareness of the need to selectively determine the themes around which teaching and research must revolve at the master's and doctoral level, just as there is the need for sufficiently rigorous planning in relation to the choice of these themes. In view of competition within the same disciplines among the various universities and in view also of the strengths and limitations of local resources, it certainly appears that a department will successfully establish its discipline at the level of graduate education and research only by concentrating its resources and efforts on judiciously determined objectives.

The departments that have become aware of this situation have worked together to determine the aspects or sectors of their discipline which they consider most urgent to develop and in relation to which they have begun to regroup their resources. The effects of this cooperative approach appear in the organization of the curriculum which has become stable and more distinct around these aspects or sectors. They also appear in the research work of faculty and students which tends to revolve around development themes. We have indicated above that these same departments have the greatest coherence regarding the development themes of departmental research, individual research projects of faculty and the research work of students.

Conversely, certain departments have expressed their concern about the apparently inevitable consequences of the implementation of a policy whereby resources are concentrated in terms of specific objectives, even when this involves departmental cooperation. They argue, for example, that the validity of such a policy depends on the quality of the aspects or sectors retained and the validity of the criteria used in formulating choices. It seems that not every discipline lends itself at the present time to such choices. In these circumstances, they consider it preferable to rely on empiricism rather than arbitrariness. Moreover, the pressures aimed at concentrating efforts and

resources sometimes run directly counter to a lengthy tradition of personal initiative which may result, as stated above, from the epistemological conditions of knowledge in certain disciplines, especially in the humanities.⁵

There are many factors that account for this regrettable situation, including the number and qualifications of teachers in the human sciences. As we have seen, the teacher/student coefficient on the whole does not appear to be at fault, though it is higher in the human sciences than in the natural sciences: it is at 10.6 students per teacher at the undergraduate level (11.7 in the human sciences and 8.4 in the natural sciences) and there is approximately one teacher per student at the graduate level. However, specific data by university and discipline are needed. The case of Laval University is significant:

The human sciences group occupies a predominant position in the university. In October 1974, it numbered 640 teachers and 1,925 students in graduate studies, namely 53% of the teaching body and 70% of the students. On the other hand, it barely receives one-quarter of all research grants distributed in the university in any given year, good or bad. Over the last three years, the teaching body has increased by 10% and the number of students enrolled in graduate studies by approximately 35%. The gap between these percentages indicates that the university has assigned teachers from the undergraduate level to graduate studies or that teachers have agreed to increase their workload.⁶

Furthermore, it would be necessary to know in the case of each university and discipline the percentage of teachers involved in some work at the graduate level and the proportion of time they spend in graduate teaching, supervision of students and theses, and research work. These would undoubtedly produce less satisfactory findings than are presently suggested by our very global forms of measurement.

It seems also, at least in some provinces, that the establishment of a new program is a rather lengthy and difficult process. The report of the University of Montreal discusses the situation in Quebec:

First of all, the interested faculty or department draws up the newly planned program. The new program then undergoes a preliminary study by an ad hoc committee of the Committee on Studies (we refer to the new procedures that will be used this year for the first time), which then directs it to the Joint Planning Committee of the University Council and Senate. From there the new program goes to the Council of the Faculty of Graduate Studies, then to the Committee on Studies; following this, it is again presented to the Joint Planning Committee and is directed finally to the Council of Universities. If the new program receives the approval of the Council of Universities, budget

allocations must be decided upon by the proper university authorities before the program is entered in the calendar. Under the best of conditions, a period of two and a half years is required from the time the program is presented to the Committee on Studies to the time it enters into effect. If we include the germination period in the department and take into account the possibility of difficulties along the way, we come to the conclusion that a minimum of three years are required to establish a new program!

In the case of changes to an already existing program, the procedure is obviously not as complex nor as lengthy. However, for any modification requiring new resources, it is necessary to expect a period of one and a half years before the modified program comes into force.⁷

The length of time required to establish a new program or reorganize an existing program is enough to discourage any thought of innovation. Other factors compound this effect. Thus, administrators consider it important to maintain at all costs a high number of students to ensure the quantitative growth of the university and especially its financial benefits. The report of the University of Montreal is very clear on this point:

...the limitation of fields of specialization could also result in a fluctuation and, ultimately, a considerable reduction of enrolments in graduate studies. The preservation and development of departmental resources are at present directly related to the student clientele. As was stated by a dean who must, when presenting his budgetary estimates each year, support and defend the departments under his responsibility, few human science departments can afford to lose a portion of their clientele in the present situation, even if this means better planning. We have identified here a paradox which we will discuss again later: though planning in the field of graduate studies is being urged from all quarters, the methods of financing graduate studies do not make it possible to absorb the potential consequences, namely the fluctuation and even reduction of enrolments in these programs.⁸

The preceding observations on the program content of graduate studies remain very general. However, it becomes apparent that there is a profound malaise. The state of mind of students and teachers, as we have seen, gives us a good idea of the nature of this uneasiness. With regard to program content itself, any major and permanent improvement of the present situation will require a great deal of flexibility, intelligent experimentation and a sense of innovation.⁹

Before establishing a program, there is the question of its quality and social usefulness. This dual criterion should also help determine the required modifications in any given program or the elimination of a program that has become obsolete as a result of the evolution of scientific disciplines

and society. Not a single Canadian university could really offer and excel in all the programs. Few universities provide more than half the existing programs in the social sciences and humanities. We do not know the reasons that have led to the establishment of the programs offered by each university: the presence at a particular time of an especially competent or enthusiastic teacher, the pressure of students, the determination to achieve coordination, etc. The rule of empiricism and ambitious competition with an adjacent university have also had some influence.

Furthermore, the number and percentage of students in graduate studies and the number of master's and doctoral programs are not in themselves sufficient to judge the standard of a university. To quote but one example, Queen's University, according to these criteria, is listed with the third-ranked institutions, though its doctoral programs give the best results in Canada with respect to the number of years of study required by its students. Carleton, included with fourth-ranked universities according to these same criteria, has one of the most important political science departments in Canada. The same undoubtedly holds true for some of the programs of smaller institutions. Nevertheless, given the establishment of a certain level, the absence of a critical number and size will have certain consequences, and major objective constraints will curb the best initiatives.

Increasing reductions in the budgets of the last few years and other reasons we will dwell on later, such as the mediocrity of most university libraries, will force universities to make wiser decisions regarding the growth and development of their programs. They will have to do this if they hope to seriously pursue the objectives of excellence and social relevance, while retaining what little autonomy they still have. We know that, in the last few years, universities as a rule could only establish new programs after receiving authorization from provincial bodies. We are also aware that provincial governments have established special missions, such as ACAP in Ontario and Operations in Quebec, whose mandate is to evaluate current programs and propose their reorientation. These missions have often come up against the inertia of the university system and have had only moderate success. The political leaders, for their part, are showing a desire for control that will increase more and more unless the universities display greater internal discipline.

3. Master's Degree and Doctorate

The question of university degrees, especially the master's degree and doctorate, gives rise to numerous controversies. These degrees originated in a period when graduate institutions, education and the structures of societies differed greatly from those of today. Do they still have their *raison d'être*? If not, what is to certify attainment in higher education? Should degrees be modified and their direction and scope redefined? If so, how? Would it even be desirable to abandon all manner of official certification of university training other than the mention of the programs followed, thereby leaving society to sort out good from mediocre courses as based on individual performances in the job market? We know that some students as well as teachers are demanding the complete abolition of degrees and even of any form of evaluation of the work of students.

To apply this proposition literally would imply radical reforms in the university institution and the organization of society, and it is difficult to imagine the implementation of these reforms. It appears, moreover, that the vast majority of the teaching body favor the maintenance of degrees. However, many questions have been raised about the latter, and in the last few years the requirements and method of obtaining degrees, as well as the value attached to them, have undergone many changes.

Each student pursuing graduate studies should be consumed with a desire to acquire the best possible training in a given field of knowledge. Yet this praiseworthy and necessary ambition is in practice inseparable from an equally legitimate motive: that of obtaining at the end of several years of study a certification, namely a degree, to the effect that he has a thorough knowledge of the fundamental methods and processes of his discipline. The degree has a dual meaning, symbolic and practical, for its holder: symbolic especially in the case of a PhD, since it sanctions admission to the scientific community; practical, since the degree normally gives access to occupations and increases opportunities for promotion throughout a professional career.

There are, therefore, two major reasons for master's and doctoral studies: the learning of an intellectual discipline which is valid in itself and the acquisition of the necessary qualifications to practise an occupation. These two reasons are often combined, but they are logically distinct. Thus, the

more or less favorable conditions of the labor market at a given time for a particular kind of training does not affect the intrinsic value of the disciplines in question. They may, however, influence students faced with a choice among the programs offered by the universities and incite the latter as well as governments to invest more or less in this or that program.

It is necessary to distinguish carefully between studies at the master's and doctoral level, each having its own characteristics. Studies at the master's level in Canada have a long and honorable tradition. Even though some may propose their complete abolition, we believe they will continue to have their *raison d'être*; they must therefore be maintained. However, over the last while and especially where there are doctoral programs, a situation has developed which has led to their being discredited. From the point of view of objectives, some consider the master's as an extension of undergraduate studies and as supplementary professional training; others view these studies as a step along the way to a PhD or merely as special courses to fill gaps left at the undergraduate level; for others still, they are part of tradition, especially in view of their functions before the establishment of doctoral programs; finally, there are those who consider them redundant and think they should be abolished.

The greatest diversity, if not to say confusion, exists nowadays in Canadian universities in connection with the disciplinary requirements of studies at the master's level and administrative rules and procedures: master's with thesis or centered exclusively on courses; so-called master's by discipline which usually constitutes a first step toward doctoral studies; and so-called master's by profession, which very often has become the first true professional degree, superseding the bachelor's degree (this type of master's degree has gained importance over the last few years).

We agree with most of our collaborators who consider that the master's must be maintained as a level of studies in its own right. Educational and administrative standards must be sufficiently uniform for the degree awarded at the end of these studies to have a precise meaning for all concerned. It must be added that, in some universities, various possible ways leading to the master's have been designed over the last few years, each with its own requirements. Hence, there are the "terminal" professional master's degrees,

generally emphasizing courses and without thesis; there are also master's degrees by discipline normally leading to further studies at the doctoral level, often with a thesis serving to complete the learning of theories and methodologies.

There is, therefore, at the present time no single or even preferred kind of master's degree. The experiences whereby two or three ways are proposed to obtain this degree must be encouraged. At the same time, it is urgent that uniform standards be defined and accepted for each approach. Otherwise, if the concrete objectives of studies at the master's level are not clarified, there will be growing confusion and ultimately a breakdown in these studies. This is already happening in the United States and here and there in Canada.

The PhD, on the other hand, has for a long time conferred unparalleled prestige on its holder, as if he were endowed with some magical virtue. This overvaluation has not completely vanished, notwithstanding the increased number of PhDs and the greater emphasis placed on the practical value of this degree instead of just its educational value. Its existence is therefore not being threatened, and a very large number of students still aspire to the PhD. The major problem is mainly the maintenance of quality standards.

Doctoral studies comprise many stages: admission examination, suitable curriculum for the chosen field of training, comprehensive examination, choice of thesis topic, preparation, writing and finally defense of thesis, followed or not by its compulsory publication in whole or in part. These stages may be compared to the trials which the apprentice artisan faced during the period of medieval guilds in order to become a master in his art or trade.¹⁰

If flexible, clear and accurate standards are preferable for the master's, demanding norms should be maintained for each stage of the PhD, from the admission examinations to defense of the thesis, including the comprehensive examination whose very nature and even existence have been questioned in the last few years. Only very capable and highly motivated students should be admitted to doctoral studies, and then subjected to strict and periodic control throughout their entire advanced studies. Doctoral study demands the use of scarce and costly resources, and consequently few occupations require that their members pursue studies to such an advanced level. In short, the restrictive approach we recommend is proper both for scholarly and professional reasons.

To maintain the traditional doctorate at a high level and enable a greater number of students to obtain it, since the PhD is greatly valued by certain professions, and especially to attain the higher levels of these professions, some have suggested the establishment of two channels: a so-called research doctorate and a so-called teaching or professional doctorate (doctorate of arts).¹¹ They state that it is not a question of adding a second-class doctorate to a more difficult traditional doctorate. It is true that the traditional doctorate has been designed with a view to university teaching and scientific research and that, in actual practice, most PhDs are attracted again today to university teaching and research. The way they are actually conceived, doctoral programs really do not adequately meet the needs of certain occupations, especially teaching at the college and undergraduate levels. Traditional doctoral studies that would be as rigorous, but oriented differently, would be more suitable and would reduce the risk of disappointment on the part of numerous graduates who do not work at tasks for which the traditional PhD has prepared them.

It would certainly be better to consider two separate but qualitatively similar approaches for the PhD as well as the master's degree than to risk softening, in the name of uniformity, the conditions for obtaining a PhD. This point gives rise to a great deal of discussion in the United States and is not ignored by Canadians. Above all, the following prediction by Clark Kerr must not be allowed to come true:

By the year 2000 the bachelor's and master's degrees would be discarded, the PhD would be the first degree in course to be awarded, and there would be more postdoctoral than predoctoral students in the universities.¹²

We have not yet reached this point. However, many of our collaborators, especially the authors of the reports of the task forces, note a tendency to abolish the master's as well as a constant decline in admission requirements for doctoral studies.¹³

It would be advisable to examine closely the usefulness of the comprehensive and the objectives of the thesis.

Bernard Berelson has this to say about the thesis:

The traditional conception of the dissertation is clear. It was supposed to be an original and significant contribution to knowledge. Now that, of course, is only a statement of intent. The decision as to what was sufficiently original and significant, what was contributory, and indeed, what knowledge was left to the departments... Over the years, however, questions have arisen not only about realizing that aim but even about the appropriateness of the aim itself... the notion of 'significant contributions of knowledge' has come in for some hard questioning too...: To assure 'contribution' a premium is placed on novelty when the problem is set, with the result that the dissertation is more frequently peripheral than central; more often incidental than fundamental... Insofar as the thesis problem is recondite, or has permitted sacrifice of significance to gain novelty or originality, the thesis process is bad education... At any rate, it would be worth our time to examine, in graduate schools, whether the allegations are correct that 1) the thesis diverts attention from the significant central problems of the discipline toward the novel and peripheral, thus sacrificing the prospects of wisdom and understanding in the false hope of guaranteeing a contribution to knowledge; and that 2) the thesis as presently required may bury over more creative minds than it awakens to continuing creativity... At the end of the nineteenth century it was commonly held that the doctoral dissertation must represent a contribution to knowledge in the sense of bringing something undiscovered into the world of learning. Although this concept of the dissertation still lingers, the dissertation is now more commonly regarded (in the humanities, at least) as a test of maturity of mind and of professional competence... It is a problem of mature interpretation rather than of originality in the sense of the 'unique thing'.¹⁴

The British committee of vice-chancellors and directors, which concentrated on studying the PhD, concluded it was essential to maintain the degree in view of its educational value, though it recorded the criticisms directed at this degree:

The educational value of the PhD, for example, is central to our purpose. We are fully aware of the criticisms which have been leveled at the PhD; that it often concentrates too much on a narrow field, and this may have the effect of making a student inflexible and unwilling to turn his mind to other subjects; that research students may be employed on tasks chosen not because of their educational value but because they contribute toward some large research programs; that some PhD students are not of the intellectual quality to contribute usefully to significant research... The aim of the PhD course, and, at their different level and scope, of the other research degrees, is to give students a training which makes them capable subsequently of assuming the role of independent scholars and research workers at the highest level, capable of planning and carrying to completion a well-conceived program of research directed toward a given objective without the supervision of more experienced people.¹⁵

The strongest criticisms do not come nowadays from those opposing the PhD for educational reasons but from those who consider it unwise to further develop

doctoral studies in view of their very high cost; their occupational usefulness is quite limited and the careers open to those with a research doctorate are oversupplied at the moment. Hence the increasingly expressed fear that governments may withhold necessary resources to the point where this degree may be threatened, both in numbers and quality, in the near future.¹⁶ We believe these fears are exaggerated. We consider, on the contrary, that for reasons that will be examined in the next section, there will be many new opportunities for scientific research and also for teaching in the human sciences.

4. Postdoctoral Studies

Contrary to the United States, very few students pursue postdoctoral studies in Canada, and nearly all of those who do are in the natural sciences. These scholars intend to follow a university teaching or advanced research career, or may even be already engaged in one or the other. Their main motivation is to improve their career opportunities.¹⁷

A recent study by Max von Zur-Muehlen is the most comprehensive report available on postdoctoral studies in Canada. His remarks are quoted verbatim: Postdoctoral education is a neglected area of investigation in Canada. A recent study in the United States spoke of the 'Invisible University' and remarked that 'postdoctoral activity takes place so unobtrusively and indeterminably that little note is taken of the event except by the participants'.¹⁸ This observation is equally applicable to the Canadian scene.

Although there have been two projects on postdoctorals at Ontario universities which provided a provincial viewpoint, there has never been a national study of postdoctoral education in Canada.¹⁹ Statistics Canada, which collects annually many statistical series on university education about students, faculty and finances, has never gathered information on the postdoctoral student population (Appendix III, 53 and 54).

There are at present approximately 2,500 postdoctoral students at Canadian universities in all fields of study receiving, on the average, a \$10,000 annual stipend and costing the universities another \$15,000 each per year. Therefore, the total expenditure amounts to \$62.5 million. In most provinces, postdoctoral students are not part of the formula financing schemes, and consequently, the universities are not reimbursed for this type of expenditure. It is interesting to note that under the Federal-Provincial Fiscal Arrangements Act of 1967, and its extensions, the federal government absorbs about 50 per cent of the educational costs for postdoctoral training

The financial assistance for postdoctoral students in the natural sciences is mostly derived from the National Research Council and the Medical Research Council of Canada. The National Research Council alone supports almost 1,000 postdoctoral students through its fellowship programs and through faculty research grants which are frequently used to maintain postdoctoral students.

A postdoctoral appointment refers primarily to a position in research training to which a person is appointed following his completion of the requirements for a doctor's degree immediately after graduation. Occasionally a postdoctoral appointment occurs not immediately but after a number of years in the labor force or as a senior postdoctoral fellow on leave from a university. Yet, the numbers involved in these categories are rather small in Canada.

Postdoctoral appointments exist primarily in the natural sciences, particularly the physical sciences (i.e., chemistry, geology and physics), in the mathematical sciences, in engineering and the life sciences (i.e., agricultural and biological sciences) as well as in the health sciences, which means postdoctoral training in the medical, dental and other professional fields where they are frequently called research associates.

In Canada, the number of postdoctoral positions in the human sciences (i.e., the humanities and social sciences) is negligible except in psychology, and therefore most of the discussion will be limited to postdoctoral activities in the natural sciences.²⁰

Moreover, the following analysis does not consider postdoctoral positions in the federal and provincial government sector (such as in the Department of Agriculture and the National Research Council of Canada) and the appointments which exist in industry and nonprofit organizations. It is estimated that less than 500 postdoctoral openings are altogether available annually in these sectors. In addition, in recent years, about 500 Canadians each year continued their research training at the postdoctoral level abroad, primarily in the United States and Great Britain but this number has been gradually declining.

According to the National Research Council of Canada, there were in 1956 only 48 postdoctoral students in the natural sciences at Canadian universities, excluding appointments at medical schools.²¹

In 1967-68, the number had increased to 943, and continued to grow to 1,502 in 1971-72. At present, it has been estimated that there are 2,000 postdoctorals in the natural sciences excluding the health sciences at Canadian universities, which indicates an annual growth rate of 13.3 per cent since 1967-68.

In contrast, the total number of PhDs granted in Canada has not changed during the last three years, and is slightly less than 2,000 annually. For most natural science disciplines, there has actually been a decline in the number of PhDs produced, but this has been compensated by a larger number of PhDs granted for the humanities and social sciences. In the future, there will be a further decline in the number of PhDs graduated from Canadian universities due to the fact that the PhD enrolment in many natural science disciplines has declined since the early 1970s.²²

Von Zur-Muehlen's remarks are confined to the natural sciences.²³ He makes the following observations: the cost of these studies is unknown, the status of students ambiguous, and the program and number of years of studies indeterminate; students seek a permanent status and risk forming a university proletariat, since there are very many of them in certain disciplines, especially

mathematics, physics and chemistry, in comparison with the United States. Consequently, their employment opportunities - all want to become university teachers - are no better than those of PhDs. In our estimation, it would not be advisable at this time to organize postdoctoral studies in the human sciences. There still remains too much to be done at the doctoral level in this sector to increase the competence of teachers and provide the required means. Moreover, in view of the existing and foreseeable trends in the labor market, the major effect of this initiative would probably be the creation of a "permanent army" of students.

This category of postdoctoral students is separate from research assistants and associates who are directly attached to a project and work under teachers. Though fewer in the human sciences than in the natural sciences, these assistants and associates nevertheless grow in numbers year by year as university research progresses in the human sciences, and they perform essential functions. Unfortunately, there are no accurate data on them. A study of these research assistants and associates must be undertaken without delay to determine their status in the universities, their working conditions and their subsequent employment opportunities. If they too formed a kind of "university proletariat," means would need to be found to correct this situation.

5. Graduate Studies and Continuing Education

"Dropping out" is often confused with the necessary interruption of studies for personal or financial reasons. A certain number of students who have abandoned their studies at one stage or another later resume them. There are others who return to graduate studies for retraining purposes or to complete an education that has been interrupted or because they need a degree.

Numerous studies are now available on continuing education at the undergraduate level, which universities have begun to organize. At the graduate level, universities have shown to date very little interest in this particular category of students, since the distinction is rather between full-time and part-time students; the latter comprise 45 per cent of all master's students and about 30 per cent of doctoral students. A certain number of these part-time students must be considered as engaged in continuing education.

We know nothing of the possible relation between part-time studies and

continuing education at the graduate level. Many part-time students have probably completed their course work and are writing their thesis. However, the proportion of those completing their course work while working full-time or part-time seems to be rising. Universities have yet to find a suitable way of dealing with such students and offering them programs that they can complete in their particular and often difficult situation.²⁴

6. Length of Graduate Studies

The length of graduate studies in the humanities and social sciences is considered by all as being unduly lengthy, especially at the doctoral level. "Dropouts" and the failure to finish theses once courses are completed ("All But Dissertation" or ABD) very much concern those who are interested in the development of graduate studies. Most of our collaborators echo this concern.

Graduate studies are expensive - from \$5,000 to \$10,000 a year per student, excluding living and personal costs, according to academic specialization.²⁵ In addition, the Canadian economy must absorb close to 100,000 university graduates every year from the three levels; but jobs are scarce, especially in the public sector and teaching, which are the major traditional markets for these graduates. Access to graduate studies, especially at the master's and doctoral level, should therefore be limited to those who are likely to complete their studies; moreover, students should be encouraged to finish their studies within a reasonable period of time.

We do not have complete and accurate data concerning the actual length of graduate studies in the human sciences. Most doctoral programs in nearly all universities are too recent and their number too small in most disciplines to draw statistically valid conclusions.²⁶

Several methods may be used to calculate the length of graduate studies: the period of time between the obtaining of bachelor's and doctoral degrees or between admission to graduate studies and the obtaining of a PhD; the uninterrupted period of time spent in doctoral studies per se up to the actual PhD. One could also measure the time required to pass the various examinations from the admission examination to the comprehensive to the defense of the thesis.

For purposes of comparison, it is useful to cite two studies conducted in

the United States by the National Research Council, one in 1936 and the other in 1957, on the period of time between the obtaining of a bachelor's degree and a PhD. In both cases, the length of time was eight years. There were, however, marked differences according to sectors: six years for physics, eight years for social sciences and 10 for the humanities. The average length of time between admission to the master's level and obtaining a PhD was four and a half years for the natural sciences and six years for the humanities and social sciences. The third measure, namely the estimated length of full-time studies to complete the doctorate, revealed that three to five years were required according to sectors.²⁷

In his study on doctoral studies in Canada, Max von Zur-Muehlen writes that one of the most disappointing aspects of graduate studies in Canada is the small number of PhDs awarded in the humanities and social sciences in relation to total PhD enrolment in this sector:

An attempt has been made to estimate the ratio of PhDs granted to total PhD enrolment for a six-year period, by field of study and for some selected disciplines. To avoid yearly fluctuations, these calculations have been based on a six-year average... This average shows that about 20 per cent of PhD students have graduated each year in the natural sciences, compared with only 6.7 per cent in the humanities and 7.5 per cent in the social sciences. In chemistry, for example, 23 per cent received doctorates each year compared with 4.6 per cent in political science and 4.8 per cent in sociology. This means that chemistry was five times more productive than political science and sociology. Expressed differently, it would take a cohort of 100 chemistry doctoral students slightly more than four years to graduate, whereas similar cohorts in political science and sociology would take over 20 years.²⁸

The Canada Council conducted a survey in 1974 of 1,032 of its 1,554 fellows of 1968-69.²⁹ To appreciate their findings properly, one must recall that these former fellows of the Canada Council account for 35 per cent of all doctoral students enrolled in the humanities and social sciences in Canadian universities.³⁰ Some of these fellows attend universities outside of Canada, and foreign students are enrolled at Canadian universities. These findings can be expected to be above average since the selection committees of the Canada Council have chosen students on the basis of their academic achievement and the recommendations of their teachers. Moreover, these students feel a great need to complete their doctoral studies since 90 per cent of them teach, mostly at university, and a PhD is normally required if

they wish to pursue such a career.

Some of the data are listed in the Appendix (Tables III, 64.1-64.6). Out of 1,032 fellows surveyed, only 428 or 41.5 per cent pursued or were pursuing their studies in Canada. The others were enrolled in the United States (28.6%), the United Kingdom (16%) and France (10%), with only a few of them attending other foreign institutions. We must acknowledge that this proportion of 41.5 per cent of Canada Council fellows of 1967-68 pursuing their doctoral studies in Canadian institutions is very low. This seems to be due to two facts: on the one hand, graduate studies were still poorly developed in Canada less than 10 years ago; on the other hand, the complete freedom of choice allowed by the Canada Council encourages students to enrol in foreign universities, either because of the latter's reputation or because students seek to derive cultural or other benefits from foreign countries. However, the proportion of students remaining in Canada and those going outside is today inverse. This is a healthy evolution, and we would even suggest that doctoral fellowships should, except for very special reasons, be granted henceforth only for attendance at Canadian universities. The latter have shown sufficiently that they provide quality programs in the humanities and social sciences; moreover, the presence of better doctoral students can only accelerate the development of Canadian universities.

Overall, more than 20 per cent of the fellows enrolled in 1965 or earlier, namely nine years ago or more, had still not obtained their PhD and were continuing their studies in 1974; and only 45 per cent had been granted their degree after four years of studies. The average length of studies for graduates was 4.7 years.

The performance of students, however, varies greatly according to whether they attend Canadian or foreign universities. The results are very inferior for those studying in Canada. Only 28.9 per cent of the latter obtained their PhD within five years, compared with 57.1 and 53.5 per cent, respectively, of those in American and European universities. After eight years, the percentages were 72.4, 84.7 and 85.3, respectively. The United States who, at the outset, had many fewer doctoral candidates than Canada (295 against 428, or 68.9%) have, at the end of nine years, only 15 less graduates (216 against 231, or 93.5%). A comparison of the Canadian success rate with that of

European universities produces similar percentages.

The average length of studies, from enrolment to obtaining of PhD, is five years for those studying in Canada and the United States, higher than for those in the United Kingdom and France (4.1 and 3.6 respectively), where doctoral studies are generally limited to the thesis.

In addition, students in the humanities achieve better results than those in the social sciences. Similarly, results are better among males, married fellows, those with family dependents, landed immigrants and Anglophones than among females, single men or women, fellows with no family dependents or Francophones. The variations by discipline are also extensive, with anthropology, political science and sociology having very poor results as opposed to psychology, economics and geography.

René H. Lemieux willingly provided us with the distribution of respondent fellows by university as well as the number who obtained their PhD. We find the same universities heading the list as those ranked first according to all our indicators: Toronto (140 fellows and 78 PhDs), British Columbia (41 and 18), Queen's (41 and 17), McGill (35 and 19), Alberta (29 and 18), Montreal (29 and 16), Laval (24 and 11), Western (20 and 15) and Ottawa (19 and 12). These universities account for 378 fellows out of 428, or 88.3 per cent of fellows as a whole, and 204 PhDs out of 231, also 88.3 per cent of PhDs as a whole. Much further down the list are McMaster (9 and 6), Waterloo (8 and 5) and York (5 and 3). Carleton, Simon Fraser, Calgary, New Brunswick, Dalhousie, Manitoba and Saskatchewan are the only other institutions on the list of fellows, but they have only from one to four candidates. In the case of large or midsize universities, the average length of studies varies from 5.3 years for Toronto, British Columbia, Ottawa and Alberta, 5.2 for Laval, 4.5 for Montreal to 4.3 for Queen's.³¹

Finally, according to the survey, 284 (72.4%) of the 392 respondents (38% of the total) who had not yet obtained their PhD in 1974 had completed their courses but not their thesis, and 335 (85.5%) declared their intention to continue until they obtained their PhD.

If the intention of the respondents is realized, some 95 per cent of them will one day achieve their objective but, for 55 per cent of these fellows, at what price! It will have taken them from five to nine years to obtain their

PhD. Since these are presumably the best students and the results of a good percentage of them are only mediocre, one must be concerned about the others who, at the time of their application for enrolment at the doctoral level, had been considered probably as having less ability.

The task force at the University of Alberta has provided us with interesting data. At the master's level, the length of studies from admission to obtaining a degree varies from two to three years, insofar as figures are high enough to have some significance; there are, however, some unusual situations, such as the six history graduates in 1973-74 who needed an average of four years and eight months to obtain their degree. At the doctoral level, insofar as figures are high enough to have some significance, the length of studies varies from three to six years; here again there are cases where it took seven or eight years to obtain the PhD. The task force has compiled in a table the number of enrolments, dropouts and graduates from 1968-69 to 1973-74. However, the data on dropouts - from 10 to over 22 per cent according to the years - are not very significant and the numbers and percentages of graduates were not calculated by using the method of cohorts; the following table should thus be used only as an indication (Table 3).

Between 1968-69 and 1973-74, there were 5,025 enrolments in graduate studies at the University of Alberta. Of this number, 750 students or 15 per cent, dropped out of university, and 899 or 17.9 per cent obtained their degree. The other 3,395, or 66.5 per cent, appear to still be pursuing their studies, and a certain number of them are undoubtedly students who enrolled in the year 1968-69.

Of all the universities, it is the University of Toronto that educates the largest number of graduates in most disciplines. The task force at this university has compiled for us very informative data on the master's and PhD. Overall, it takes a little over one year from the start of graduate studies to obtain a master's, and for the PhD it takes about four years in the natural and health sciences, five years in the social sciences and five and a half years in the humanities. However, here again there are large differentials. Out of 368 PhDs in the natural sciences between 1970 and 1973, 128 took four years, 74 five years, 123 only two years and 41 between seven and nine years to obtain their degree. And out of 253 PhDs in the humanities,

Table 3

Graduate Enrolment, Dropout and Graduation Patterns
in the Humanities and Social Sciences at the
University of Alberta, 1968-69 to 1973-74

Year	Enrolments	Dropouts	Graduates
1968-69	709	110 (15.5%)	115 (16.2%)
1969-70	832	110 (13.2%)	133 (16%)
1970-71	881	95 (10.8%)	168 (19.1%)
1971-72	884	120 (13.6%)	182 (20.6%)
1972-73	869	122 (14%)	169 (19.4%)
1973-74	850	193 (22.7%)	132 (15.5%)

Source: University of Alberta Task Force Report, p. 63.

Note: This table may be used only as an indication of completion rate, because the graduate population is not completely synonymous with the enrolment of any given year. In addition, because of the difference in length of time for completion of the master's and doctoral programs, the ratio of graduates to enrolment can be altered by alterations in this distribution.

178 took from four to seven years but, here again, 27 obtained their degree in three years or less and 36 took from eight to 10 years. Finally, out of 79 PhDs in the social sciences, 51 took from four to six years, 14 two to three years, but 13 between seven and 10 years.³²

The percentage differentials between students in the humanities and social sciences and those in the natural sciences completing their doctorate after a certain number of years are very considerable. (For each field, i.e., humanities, social sciences, natural sciences, a sample discipline was selected and the cohorts of each for the years 1968, 1969 and 1970 were followed over a period of several years - until 1973 for the social science discipline and 1974 for the other two). For a humanities department, the proportion of those having obtained their PhD was 19 per cent (3 out of 16) after seven years of studies, 13 per cent (4 out of 31) after six years of studies and 5 per cent (1 out of 18) after five years of studies. For a social science department, 19 per cent (5 out of 26) had completed their studies in six years, 18 per cent (3 out of 17) in five years and zero per cent (0 out of 22) at the end of four years. On the other hand, in a natural science department, 50 per cent (12 out of 24) had received their PhD after seven years, 54 per cent (19 out of 35) after six years, and 47 per cent (8 out of 17) after five years. There are other conspicuous facts in the humanities and social sciences: the very high proportion of those who, after many years, had still not successfully passed their comprehensive and the small number of those who were known to have dropped out.

The University of Toronto agreed to undertake at our request a study of cohorts of students enrolled in September 1966 at the doctoral level in four different disciplines: two in the social sciences, one in the humanities and, for comparison, one in the natural sciences (Appendix III, 65.1-65.5).

Out of 13 students enrolled in one of the two social sciences in 1966, two (16%) were still pursuing their studies seven years later in June 1973, five (38%) had obtained their PhD and the other six (46%) had dropped out or did not enrol again. Out of 29 students enrolled in a discipline of the humanities in 1966, eight (28%) had obtained their degree, 13 (45%) were pursuing their studies and the other eight (28%) had dropped out or did not enrol again. Out of the six students in the social sciences in September 1966, two (33%) had

obtained their degree, two (33%) were pursuing their studies and two (33%) had dropped out. In each of the disciplines in the humanities, one student of the 1966 cohort did not enrol in the 1973 fall session. The situation was different in the physical sciences. Out of 35 students enrolled in 1966, only one (3%) was still studying in June 1973, six (17%) had dropped out and 28 (80%) had obtained their PhD.

Though these data are not as complete as one would wish, it is possible to make certain hypotheses and observations. The success rate at the graduate level appears markedly higher in the natural sciences than in the social sciences and humanities. In the case of the latter, the length of studies and the large number of dropouts are even more characteristic of the PhD than the master's. Some students are able to complete their master's studies in less than two years and those of the PhD in three or four. How can one explain, then, that many other students obtain their master's only after three or four years and their PhD after five to 10 years? How can one also explain the considerable differentials among the various social science disciplines and especially the humanities?

Those who complete their studies have often taken too much time. Moreover, two other facts are a source of concern: first, the very high percentage of those who drop out, often after four or five years³³ and, then again, the number of those still studying seven years after their enrolment and who appear embedded in the university to the point of actually becoming "career" students. The data provided by the Canada Council, the University of Alberta and the University of Toronto are very alarming, especially if we compare them with the completion rate of doctoral students in the natural sciences. Even though these data are incomplete, the extent of the differences between the two situations is such that corrective measures are required.

The proportion of full-time and part-time students is another indication of anomaly in the human sciences at the graduate level.

Out of a total of 39,150 master's students in 1974-75, 17,255 or 44 per cent were enrolled part-time. In the same year, out of 5,977 students in the humanities, 2,263 or 38 per cent were part-time, and in the social sciences, 11,308 out of 22,217, or 51 per cent, were part-time whereas out of 9,325 in natural sciences at the master's level, 3,018 or only 32 per cent were part-time.

Out of 13,116 students enrolled overall at the doctoral level, 3,745 or 29 per cent were part-time. Out of 2,974 in the humanities, 996 or 34 per cent were part-time; in the social sciences, 1,753 out of 4,796, or 37 per cent, were studying part-time. In the natural sciences, out of 4,950 students enrolled, only 921 or 19 per cent were part-time. These very marked differences reflect the opposing views of graduate studies in the natural and human sciences. This situation is unacceptable and must be corrected as soon as possible. To start with, the exact reasons for this must be determined. These reasons are numerous, including administrative delays, excessive leniency in admissions,³⁴ course requirements that are too demanding especially in the case of the comprehensive examination and the thesis, conviction on the part of the students that a degree will not improve their employment opportunities and lack of money. Each of these reasons is somewhat valid but, taken individually or collectively, they cannot adequately explain everything. Other reasons must be sought elsewhere. Thus, the organizational differences between graduate studies in the natural and health sciences and the human sciences perhaps better explain the deficiencies. The brief presented by McGill University deals with this point:

To illustrate the point it is necessary to set up two models, which admittedly represent extreme cases along what is probably a continuum. At the one end lies the natural science model, where colleagues and research students share the facilities of a laboratory under the control of the senior scholar, whose reputation is the reason for the funding of the research, the provision of equipment, and of support staff. All are members of a community, each investigating an aspect of some common research problem. Each single project is one of the building blocks which are essential parts of a final edifice of discovery. All are members of a community, held together by a common objective. Reasonably close physical contact and involvement with this common goal leads to frequent and stimulating discussion which is both a learning process and an incentive to move ahead rapidly.

The alternative model may be found in the humanities and the social sciences. The student has completed his course and examination requirements which bring him in regular contact with a variety of the staff of the department. His contacts then become limited to those with his supervisor and possibly other members of his dissertation committee. He seeks out and organizes his data in a library which may be in another centre, or in fieldwork. His contact with his supervisor and with other researchers in his field may be slight. He must pace himself. His supervisor may or may not be currently concerned with his research problem. Indeed a busy supervisor may find himself with several research students working on a range of problems which stretches across his whole area of competence. Coping with them simultaneously

is for him something like playing several games of chess at the same time. In this model the 'community' which existed in the 'building-block' model scarcely exists.

While it needs to be stressed that much research in the humanities and social sciences falls short of this extreme and approaches the 'community' model, the fact remains that some departments do experience a sense that their graduate students in the research stage are 'lost' to the community, apparently absorbed in their own lonely task, and lack the stimulus of close contact with the department as a whole which might well have the effect of speeding up their progress and enriching their work.

One way in which the isolation of the researching student can be minimized is through greater use of both departmental and interdisciplinary seminars, and it would seem that such activities are increasing. However, these added obligations - whatever their benefits - are an added burden on the time of busy staff members whose available time is already heavily committed by teaching and administrative duties which in the case of the latter have greatly increased in recent years as the process of university decision-making has been 'democratized'.

The problem is not an easy one. It is doubtful if research in the humanities and social sciences - even with the growth of 'team' research - can ever be wholly organized in the same way as in the natural sciences, where each researcher is engaged in the construction of a separate 'building block' out of which will emerge a coherent edifice of discovery. Nevertheless, it would seem worthwhile to direct attention to the nature of the problem, to encourage faculties and departments to recognize it, and to explore measures to minimize it. It is not enough to speed up the clogged stream of degree candidates by simply exhorting 'Faster!'.³⁵

Notes

1. For complex applications of some of these indicators, see Cartter, An Assessment of Quality in Graduate Education (Washington, D.C.: American Council on Education, 1966) and Kenneth D. Roose, Charles J. Anderson, A Rating of Graduate Programs (Washington, D.C.: American Council on Education, 1970).
2. The Queen's University Report states that graduates should constitute 15 to 20 per cent - the critical mass - of the total student body:
 "An effective graduate program also requires some critical mass of able students. There is much to the belief that graduate students learn more from each other than they do from their instructors. If a figure must be chosen we would suggest that graduates in all areas combined should constitute perhaps a minimum of 15 to 20 per cent of the total student body within any university. Any smaller percentage will not provide the critical mass to give an effective graduate ambience to the university or to give the graduate component sufficient strength to argue successfully for its share of the university's resources, and except perhaps in a large university it might not permit the graduate school to offer the full range of courses and faculty necessary for a first-class education."
 Task Force on Graduate Studies and Research in the Humanities and the Social Sciences, Queen's University, A Commitment to Excellence (Kingston, 1975), p. 21. The authors of the Report would readily admit that it is not enough to take into account this percentage alone. They would consider a university to be excellent, if out of a total of 1,000 students, 150 were graduate students. But 150 students registered in 30 or 40 different subjects is hardly enough for graduate programs to be offered. The authors of the Report would surely agree to add the criterion of the mass of the student body to that of percentage.
3. The Robarts Library at the University of Toronto is three times as rich as the U.B.C. library, the next one in line; this is an additional indicator of its predominance. The other two universities which excel, according to these indicators, get high ratings, after the University of Toronto and U.B.C., for their extensive library collections. The institutions in question are McGill University and the University of Montreal. The results obtained here can no doubt be confirmed by the other possible indicators. These four universities are followed by the universities of Alberta, Western Ontario, Manitoba and Laval, which also rate well according to either of our criteria. On this subject see the study prepared for the Commission by William Watson and Basil Stuart-Stubbs, Canadian University Libraries and Research in the Humanities and Social Sciences (1975), p. 14.
4. For comments in the same vein, see Charles G. Mayo, "Trends in Political Science: Implications for Graduate Education ", in Leonard Kent and George Springer, eds., Graduate Education Today and Tomorrow (Albuquerque: University of New Mexico Press, 1972), pp. 111-123. We will deal later in detail with this important question.

5. Report of the University of Montreal Task Force, pp. 128-130. Also, Report of the President's Committee on the School of Graduate Studies, op.cit., pp. 22-45.
6. Report of the Laval University Task Force, p.4.
7. Report of the University of Montreal Task Force, p. 132.
8. Ibid., p. 130.
9. A Commitment to Excellence, p. 23
10. For an extended comparison, see Robert T. Holt, John E. Turner, "The Scholar as Artisan", Policy Sciences, vol. 5, (1974), p. 269.
11. For similar points of view see Fredson Bowers, "On a Future for Graduate Studies", A.A.U.P. Bulletin, vol. 56, (December, 1970), and Lawson Crowe, "Will the Future Be Like the Past?", Graduate Education Today and Tomorrow, L. Kent and G. Springer (1972), pp. 30-33. Deane E. Bomheimer, et al., The Faculty in Higher Education (Danville, Illinois: Interstate Printers and Publishers, 1973), pp. 39-40. For criticism of this point of view, see Bernard Berelson, Graduate Education in the United States, op.cit., p. 89, and the Committee of Vice-Chancellors and Principals, Post-graduate Education (United Kingdom: published by the Committee, 1975); also, A Commitment to Excellence, pp. 18-19; A.M. Heiss, The Preparation of College and University Teachers, Centre for Research and Development in Higher Education (Berkeley: University of California Press, 1968); P. Woodring, "The Profession of College Teaching", The Journal of Higher Education, vol. 31, (May, 1960), pp. 280-282. Regardless of what is said, Arts PhDs are much less demanding than PhDs in research; at the universities which offer Arts PhD programs, this degree is considered to be a second-class degree.
12. Gustave O. Arlt, "The Future of Graduate Education", Education, vol. 92, no. 3 (February-March 1972), p. 90.
13. The University of Toronto Task Force deals with this in detail, p. 30 et seq.
14. Bernard Berelson, op.cit., pp. 173-175, quoting Meredith Wilson and Howard Mumford Jones.
15. A.U.K. Report, ibid.
16. Most of our contributors echoed this fear. For another account, see Stephen P. Dresch, "Research, Graduate Education, and the University", Educational Research (1972).
17. Bernard Berelson, op.cit., pp. 190-192.

18. National Academy of Sciences, The Invisible University, (Washington, D.C.: 1969).
19. L.C. Payton, Post-Doctoral Education in the Ontario Universities (1969-70); A Report Submitted to the Council of Ontario Universities (March, 1972).
L.C. Payton, Post-Doctoral Education in the Ontario Universities (1973-74); A Report Submitted to the Council of Ontario Universities (October, 1975).
20. According to the Report of the University of Toronto Task Force (Appendix G), of the 333 post-doctoral fellowships awarded in 1971-72, only five went to the social sciences and one to the humanities; of the 309 fellowships for 1972-73, only one went to the social sciences; and as for the 201 fellowships for 1973-74, they were all awarded to students in the natural sciences.
21. National Research Council of Canada, Projections of Manpower Resources and Research Funds 1968-72; Science and Engineering Research in Canadian Universities (February, 1969).
22. This long quotation is taken from Max von Zur-Muehlen, Phd Students in Canada (Ottawa: Secretary of State, August 1975). Also, Post-Doctorals in Canada in the Mid-Seventies (Secretary of State, Ottawa: August 1975).
23. Max von Zur-Muehlen, Post-Doctorals in Canada in the Mid-Seventies (1975).
24. On the situation in Great Britain, see the Committee of Vice-Chancellors and Principals, op.cit. For Canada, see Ontario Economic Council, Education Issues and Alternatives (1976); Gaétan Daoust, Paul Bélanger, L'université dans une société éducative (Les Presses de l'Université de Montréal, 1974); and Edward B. Harvey, "Canadian Higher Education in the Seventies", Interchange, vol. 5, no. 2 (1974), pp. 42-51.
25. In most provinces, universities receive more than \$10,000 a year for every PhD student. See Max von Zur-Muehlen, The PhD Dilemma in Canada Revisited, study prepared for Statistics Canada (1976), p. 22.
26. We undertook a study of cohorts of PhD students in order to determine the path each student followed. However we had to abandon this study because, more often than not, the data for the humanities and social sciences were incomplete or lacking.
27. Bernard Berelson, op.cit., pp. 157-161.
28. Max von Zur-Muehlen, The PhD Dilemma in Canada Revisited, study prepared for Statistics Canada (1976), pp. 22-23.
29. René H. Lemieux, Doctoral Fellows...What Happens? Report on a Follow-up Study of 1968-69 Canada Council Doctoral Fellows (Ottawa: Canada Council, 1976). The author very kindly provided answers to the many questions we asked about this study. Thus we were able to obtain additional data which

enabled us to distinguish between students registering for graduate studies at the PhD and at the Master's level, and between those whose program entails a comprehensive exam and those who have only to write a thesis, as in the European system. We also obtained information on success rates, classified according to university and to field of study. Although this information is not always valid on the statistical level, it has been included as an appendix. However, this study does not enable us to establish even an approximation about the number of students who failed to complete their studies. It can be assumed that the vast majority of the 522 fellowship holders who did not answer the questionnaire (33.5% either were left out, could not be reached or simply did not answer) abandoned their studies at some point. But this is an assumption that cannot be verified. However the study does show that 57 of the 392 fellows of 1968-69 (14.5%) who still had not received their PhDs in 1974 had no intention of completing their degrees - after at least six and sometimes as many as nine years of PhD studies!

30. This figure of 35% is for 1972-73. According to the data supplied by René Lemieux, of a total of 6,191 PhD students registered that year in humanities and social sciences, 2,188 were Canada Council fellows. A total of 4,588 (74.1%) were studying in Canada, 1,147 (25%) of whom had fellowships. Of the 1,041 students who chose to study abroad, 562 (54%) of them received fellowships. This gap of 79 per cent in favor of doctoral fellows studying abroad can perhaps account, to a certain extent, for their greater success.
31. The Queen's University results are exceptional, both for the number of fellowship students who answered the questionnaire and for the average length of PhD studies. Yet this institution is only the third-ranking Canadian university with regard to the number of graduate students and to the proportion of these students in relation to the total enrolment. This can be explained only by the quality of the teaching staff and the amount of time they give their graduate students. Moreover, the professors at Queen's are generally very active in learned societies and on research councils. This active communication with other members of the scientific community no doubt benefits the students. Queen's offers proof that a medium-sized university can produce remarkable results.
32. For more detailed data of the study of student cohorts, undertaken by the University of Toronto Task Force, see Appendix III, op.cit., 65.1, 2, 3, 4 and 5.
33. According to Max von Zur-Muehlen, the proportion of students abandoning PhD studies in the humanities and social sciences is over 50 per cent, whereas it is less than 25 per cent in the natural sciences, op.cit., pp. 23-24.
34. Several of the reports from our Task Forces, in particular those from the Universities of Montreal, Queen's and Toronto, suggest that admission requirements for graduate studies should be raised in order to eliminate from the start those who do not have the required abilities.

35. Report from the School of Graduate Studies, McGill University, pp. 6-8.
For comments to the same effect, see Max von Zur-Muehlen, *op.cit.*

CONCLUSION

Certain conclusions may be drawn and suggestions made from what precedes.

The standard of achievement required of candidates deserves close scrutiny. It is possible that, in addition to admission standards and the difference between apprenticeship and isolated research, more is being demanded of students in the humanities and social sciences for the comprehensives and thesis. The University of Toronto data suggest that natural science students complete their comprehensives in much less time. This may even account for most of the time differential.

Still unanswered, however, is the question of whether in the humanities and social sciences a longer time is desirable in preparing for comprehensives and needed for completing the thesis.

Other factors, however, certainly enter into account. In many universities, doctoral students in the humanities and social sciences are still allowed to pursue their studies on a part-time basis. Fellowships are comparatively fewer in this sector and the opportunities for paid work on a subsidized research project are rare; students are thus forced to find any type of work to pay their studies. This creates additional problems that may delay their studies and often interrupt them.

Many American universities require that doctoral students study full-time and agree in writing not to accept paid work during the two years of course work, as well as spend a third year in residence preparing a first draft of their thesis.

This regulation obviously favors the student with financial means. This method of compulsory residence for two or even three years, which is the rule for doctoral studies in the natural sciences, is nevertheless the only way of ensuring that studies are taken seriously and delays avoided. We therefore recommend the formation in each province of university committees responsible for the selection of the best candidates in each discipline; they would decide on the basis of the quality of the human and material resources of universities in each sector as well as the current and anticipated social needs, and would recommend to the provincial authorities concerned the granting of fellowships for two years and, upon receiving evidence of progress in the

student's work, for three years. These fellowships would cover tuition fees and all the other usual expenses of a student. In this way, students would enrol in doctoral studies in adequate numbers each year; the best among them would be selected and they would pursue their studies in the best of circumstances.

Those left aside as a result of the screening criterion of excellence could still enrol at the doctoral level as long as they met educational requirements and agreed to study full-time for two or three years. If they could be remunerated for contributing to the subsidized research work of a teacher, so much the better. If not, they would have to pay their own tuition fees through loans or other means. This set of proposals raises sensitive problems; we will deal with these in greater detail in the recommendations.

Educational changes are also required to increase the completion rate of doctoral studies in the human sciences. Natural science students again are favored. We suggest that the thesis topic be as much as possible a part of the research project of a teacher or group of teachers, as is generally the case in the natural sciences. We raise here the touchy problem of the nature of research in the human sciences, which we will discuss later.

We have no simple solution to offer. We are convinced, however, that both the prolonged duration of doctoral studies in the human sciences and the high proportion of dropouts are unacceptable. Because a number of factors may account for both delays and dropouts, it seems unlikely that any single reform can have a significant impact. There are, however, some key stages in doctoral programs where changes in procedures should have beneficial effects.

The first stage is admission of doctoral candidates. University admission procedures are open to suspicion because departmental committees may be influenced by factors that have little to do with the potential quality of the candidate. An individual professor may want a research assistant; a department may want teaching assistants or feel its prestige depends on having students in its doctoral program; the university may be attracted by the income a doctoral student may bring. We shall recommend that provincial admissions committees determine the admissibility of doctoral candidates. Such committees would be less affected by institutional pressures and should

be more objective in assessing the academic potential of candidates.

The next stage is course work leading to the comprehensives. Requirements and procedures differ among universities and among disciplines, so we cannot propose specific modifications. The studies we have referred to, however, suggest that part of the extra time taken for the doctorate in the humanities and social sciences can be accounted for by the time taken to complete prescribed course work. We believe that requirements at this level could be reduced if departments made a serious effort to discriminate between the essential and the peripheral in their disciplines and if students were encouraged to complete comprehensives within two years of beginning graduate work. We shall recommend that doctoral fellowships provide an incentive by making applications for fellowships renewals dependent on successful completion of comprehensives.

A third stage is selection of thesis topic. We are impressed by the argument that the higher proportion of dropouts and ABDs (All But Dissertation) in the humanities and social sciences is probably linked to the greater isolation of the student while working on his thesis.

Doctoral students in the human sciences rarely have the opportunity to contribute to the subsidized research work of individual teachers or groups of teachers. Such collaboration would encourage them to remain at university once their course work is completed, thereby accelerating the writing of their thesis. Since the writing of the thesis does not require the continuous use of a laboratory or library, students in the human sciences very often do full-time paid work outside the university concurrently with their studies, and thus they see their adviser all the less frequently. Moreover, since the thesis supervisor often displays only a minor interest in the student's work, supervision is sometimes very lax. The situation is different in the natural sciences where the student's work directly benefits the teacher's research.

Unable to interest teachers or other students in his or her thesis topic, the doctoral student in the human sciences is isolated, lacks stimulation and therefore risks losing confidence, and starts questioning the value of his work. The situation would be very different if students could link their topic to some other research and join a team composed of teachers and students working on related topics.

We are not suggesting that the natural sciences provide an appropriate model for doctoral research in the humanities and social sciences. We do believe, however, that more could be done to associate the supervisor with the work of his doctoral students, even if the topic is not linked directly to his own research. Again, we have concluded that scholarship requirements can provide an incentive for this closer association. We shall therefore recommend that doctoral fellowship renewal applications outline thesis topic, proposed methodology, estimated time of completion and all other details relevant to research projects. The thesis supervisor would be required to write in support of the project, justifying it as a doctoral thesis and showing that the time allowed for completion was realistic.

SECTION TWO

Research

INTRODUCTION

Graduate studies are closely dependent on scientific research, and their growth is linked to the extent of research in the university.

This fact raises two considerations: the future of graduate studies is closely linked to that of research; and university research is a function of the nature of the research per se, whatever the environment in which it is conducted, and the particular characteristics of the university.

In this section, we deal with the question of the nature of scientific research and its particular features in the university environment. We will discuss later the foreseeable future of university research.

As graduate studies are established in Canadian universities, it is only normal that increasing emphasis is placed on research. This results in the progressive introduction in the university environment of an element structurally foreign to it, insofar as the university remains an undergraduate institution whose primary objective is the transmission of acquired knowledge. From the moment a university is interested in research, the latter becomes the sustenance of graduate studies. Without the presence of true research in the university, the question of graduate studies would not relate to the university as a whole nor to its environment. Until recently, however, the term "scientific research" frequently meant research in the natural sciences. When dealing with this field of research, people felt they knew what they were talking about. In the case of research in the human sciences, they readily admitted their ignorance or scepticism. When the concept of scientific policy was raised, its implications for the social sciences and the humanities were virtually ignored.

Today, in Canada at least, the human sciences are at the bottom of the scale. Canada is not even listed in the reports describing the contributions of countries to the growth of social sciences.¹

Thus, until recently, organized research with a clear, direct influence on graduate studies came mainly from developments in the natural sciences and the life sciences. Until 1950 or even 1960, graduate studies in the human sciences were no more than extensions of the undergraduate level.

In the last 10 or 15 years, however, the human sciences have been placing greater emphasis on research, and their growth is directly linked to the

development of the latter. In most of the human sciences, research to date has been conducted mainly individually, in isolation and with most rudimentary facilities. In numerous cases, these conditions seem to be permanently established, and some people assert that research in the human sciences will forever retain these traits inherited in its early stages. Some see this as positive, since they consider it corresponds to the underlying nature of the human sciences.

Teachers of the human sciences were and are often considered mainly as teachers, at best "scholars" in the etymological sense of the word - holders of a vast reservoir of knowledge. The best among them would demonstrate the knowledge they possess of their "science" in major works published after years of obscure and solitary labor, while the majority of them would have the limited task of transmitting their knowledge to successive generations of students.

The situation of the best natural science teachers is quite different; they spend a major portion of their time on research and their graduate instruction is closely linked with the former to the point where the topics of dissertations which they supervise are connected to this research. In the human sciences, however, research is normally seen as a personal choice of the teacher. The latter is not encouraged or supported by his institution, which may even seek to dissuade him. He is confined to conducting his research on his free time, especially during the summer when he is less taken up by his teaching function. It is not surprising, then, that such research is not very "visible" to university administrators and teachers, let alone to other environments. In many cases, the only tangible evidence of this research is the publication of "scholarly" work, usually a book; strangely enough in the milieu of the human sciences, articles (even those published in specialized journals) have long been considered inadequate evidence of high quality in researchers.

This situation is slowly changing. The increase in research funds since 1960, the expansion of the scientific communication system, the growth of work by teams, the closer relationship between research activities and study programs and student assignments, the greater value placed on articles and short essays, as well as the establishment of procedures to accelerate their publication are indications of a new conception of research in the human sciences. This research in the university environment is beginning to experience conditions

similar to those which have long characterized research in the natural and life sciences.

Different factors account for this evolution. The first is the very extensive and visible permeation of society by science and technology. We earlier discussed this major phenomenon in understanding the evolution of people and structures in industrially developed societies; this phenomenon has a direct bearing on the present and future situation of the university, which is precisely one of the main centres of scientific knowledge.

The status of the university and the scope of its graduate studies would be quite different if science and society had not become so closely connected with one another. The university is greatly influenced by the permeation of society by science, though not always consciously. Whether the university likes it or not, it must adjust to this new environment. Far from being exaggerated, our emphasis on university research will explain the qualitative reorientation of the university which will be imposed by this new environment.

In addition, and this point has been dealt with in the introduction, the current situation of the university affects not only the natural science sector but increasingly that of the human sciences. The university cannot continue to confine the human sciences to undergraduate teaching without committing a serious error. It cannot continue to treat graduate studies as mere extensions of undergraduate studies, as is often the case with current pedagogy and resources. The university cannot limit itself any longer to empirical, even anarchic, rules with respect to research as well as the interaction of research and teaching in this sector. It must structurally conceive and articulate the requirements of scientific research with those of teaching, so that the human sciences may achieve their full growth as rapidly as possible.

University research in these sciences has long been considered a voluntary activity requiring only a small portion of the teacher's time and supported by a rudimentary infrastructure, apart from the library. But in those places where it is of some importance, there is the realization that research even in these sciences entails direct and indirect expenditures that rise rapidly with the complexity of the research. Hence, the question of the justification of university research and granting bodies, especially the Canada Council, is nowadays of particular relevance.

Our report will deal with the central point, examined further on, of an appropriate science policy for encouraging scientific research in the human sciences.

Note

1. See, for example, K.W. Deutsch et al., "Conditions Favoring Major Advances in Social Sciences", Science, vol. 171, February 1971, pp. 450-459. Also, Herbert Jacob, "Some Consequences of the Development of Scientific Social Sciences", Senate Special Committee on Science Policy Report, Vol. I, 1971, p. 3, 207; vol. II, 1972, p. 475, 492; and John B. Macdonald, The Role of the Federal Government in Support of Research in Canadian Universities, Special Study #7, (Ottawa: Queen's Printer, 1969), p. 116. Concerning more particularly the humanities, for the most part they probably lag behind even the social sciences as far as foundations in theory and methodology are concerned. Nevertheless, the two groups of disciplines are not so different that they have to be dealt with separately; what goes for the one, also goes, as a rule, for the other. (See the Report of the University of Montreal Task Force, p. 188 et seq.)

I THE CONCEPT OF SCIENTIFIC RESEARCH

Even though research is of increasing importance in the modern university, it has certain characteristics which should be examined. Research is the basis of science; thus, the major traits of science come from the inherent laws of scientific research. Many institutions other than the university conduct research and are more or less dependent on it. Governments and private bodies as well as nonuniversity institutions are involved to varying degrees and for various purposes in heuristic activities, and all contribute to defining the specific traits of research.

There have been many equally valid definitions of scientific research; looking at its main elements, scientific research is the rational analysis of the causal or functional relationships among phenomena.

Scientific research requires of the scholar a particular frame of mind and is characterized by its original methods and the exclusive objectives it pursues.

The report of the University of Toronto task force has summarized in a succinct and striking manner the qualities required of the researcher. It states that research is "the creative work of a trained and energetic mind stimulated by curiosity about a problem of understanding."¹

Previous acquisition of advanced scientific training, creativity and curiosity, great self-confidence, capacity for work, perseverance and willingness to contribute to understanding and to restoring order in nature and society are the dispositions usually found in a genuine researcher. In view of the serious constraints which affect these dispositions, it is not surprising that research activity in the strict sense of the word is not common among teachers, as we will discuss later; there are few who spend their lifetime doing research and show tangible results for their labor.

Robert K. Merton² has identified four characteristics of scientific research: 1) universalism - assumptions and conclusions must conform to pre-established objective criteria and be accepted and utilized by all concerned; 2) communalism - as a social product, the findings of science belong to everyone and must be shared accordingly; 3) disinterestedness - the absence of self-interest on the part of the researcher and a willingness to serve above all the interests of society and science, irrespective of the opportunity for

personal gain; and 4) organized scepticism - entails reserving judgment until "all the facts are known" and can be assessed objectively.

An especially noteworthy research characteristic which Merton identifies is the universality of research related to the universalism of the science itself. This emphasis on the universality of research is particularly essential in view of two constraints which may be detrimental to research: the institutional foundations of scientific research are usually national and, in addition to linguistic and sometimes political barriers, this tends to confine the systems of communication and distribution of findings to the nation where the research was conducted or to certain social groups with political or economic influence; on the other hand, for competitive reasons or in the public interest, private bodies and governments often require that the research they fund be kept confidential.

The tradition and working conditions in institutions where research is conducted undoubtedly give rise to national "styles" of research. But the resulting science should not be termed "national" as is often done with physics or political science, be it French, American, German, etc. Though it is nationally based, research is universal like the science which is its product. Strictly speaking, there is no Canadian science but scientific research conducted in Canada.³

The "public" nature of science is also an essential aspect. This is why we consider "publicity" to be an additional attribute of scientific research, at least that conducted in the university environment. Hence, as a result particularly of the growing importance of the "make or buy policy" in Canadian federal and provincial governments, it is justifiable to emphasize the role of "publicity" in scientific research; we believe it is a fifth characteristic of science. We therefore concur with the position of major American universities, including Harvard, regarding the "secret" research contracts of governments:

Except in time of all-out war, it has been the historic policy of Harvard University to emphasize the importance to the Nation of open research in basic subjects: for this reason we avoid engagement in secret government research, and we do not accept responsibility for the administration of security clearance of any kind.⁴

Theodore Vallance spells this out in the following terms:

Pure science - basic research - is a public enterprise not in the sense of being publicly owned but in the sense that it is open to public knowledge. We

respect the ancient truism because it fosters objectivity, provides a built-in and institutionalized corrective mechanism, and thus, is the basis for the ultimate criterion of scientific truth: verification through replication.

Universalism, communalism, disinterestedness, organized scepticism and public nature are the five main ethical rules of scientific research. These rules are derived from the examination of the research features of the natural sciences, but they also apply to the social sciences and the humanities. In these latter disciplines, however, some may not be as essential or may be applied differently. We will discuss this later on.

Scientific research usually is assigned the following five objectives: development of new theories, methodologies or paradigms; reorganization and progress of knowledge; development of new industrial, social and human technologies to further man's control over nature, life, society and his existence; profound study, critical assessment and renewal of values; professional and personal development of those conducting research.⁵

Research is certainly of uneven quality and is not always in the forefront of scientific developments. A good portion of research is of secondary importance and sometimes only for the self-satisfaction of the researcher.

We have also distinguished between the very extensive research conducted in the context of "ordinary" science and the rather infrequent research prompted by "revolutionary" science.⁶ "Traditional" research (or "ordinary" science) comprises three main elements or activities: the discovery of a fact whose importance is emphasized by a paradigm, the harmonization of this fact with existing theory and application of the theory, that is, the invention of technologies. "Extraordinary" research (or "revolutionary" science) has two basic characteristics: the "paradigms" or basic concepts are new and, though out of the ordinary, they hold such promise that the researcher attracts a group of faithful adherents; the latter abandon traditional practices and thereby lay the foundations of a subdiscipline or even a new discipline. The resultant findings open vast prospects, reveal new problems for the scientific community and help discover new assumptions and solutions. Aristotle, Ptolemy, Euclid, Newton and Einstein head the list of those whose work revolutionized science.

Most scholars - a good thing for the stability and deepening of knowledge - do "ordinary" science; that is, they contribute to exhausting the potentials

of paradigms not yet fully explored. Within this sphere, scholars may expect to be judged by their peers. The eminent personalities of traditional science, extensively represented on selection committees of bodies funding research, are rarely enthusiastic about the initial endeavors of "revolutionary" science. On the contrary, they often restrain its scope, assuming they are able to appreciate the latter.⁷ Generally, it takes many years for "revolutionary" science to assert itself and achieve recognition in colleges and universities. When its worth is finally recognized, its initial, creative impetus is often lost.

In short, the results of research - science itself - have no boundaries: science is more fluid over time and space than men, various forms of money and technology. This leads to the following important consequences: a discovery resulting from research conducted in a given country may benefit particularly, though not exclusively, another country better able to exploit the research findings; rather than undertake research, a country may import the findings and benefit equally, at least over the short term. Furthermore, a country must sometimes repurchase the research findings of its own researchers which had been "sold" to foreign countries. It may be necessary for researchers of a certain country to provide their services to organizations abroad before or during the course of their research. Some countries thus have a scientific dependence on other nations, a dependence whose causes and effects are equivalent to a state of economic and political colonization. These combined factors often determine relationships of domination and subordination among countries.⁸ The ideal of scientific research, symbol of the solidarity of the human race, is far from having been reached ...

Notes

1. Task Force for the Canada Council Commission on Graduate Studies in the Humanities and the Social Sciences, University of Toronto Report, Toronto, 1975 (unpublished), Appendix L, 3-6.
2. Robert K. Merton, Social Theory and Social Structure, (New York: Free Press, 1957), pp. 552-561.
3. See David Easton, "On the International Character of Political Science", Bulletin, (Ottawa: Canadian Political Science Association, 1976), vol. 5, no. 3. Also, Alan C. Cairns, "National Influences on the Study of Politics", Queen's Quarterly, vol. 81, no. 3, (Autumn 1974), pp. 333-347.
4. Statement of M.C. George Bundy, Dean of Faculty of Arts and Sciences of Harvard University, before U.S. Senate Committee on Government Operations, March, 1955, Washington, D.C., pp. 470-472, quoted by Theodore R. Vallance, "The Government-University Relation in Social Science: A review of Some Issues", The American Behavioral Scientist, vol. 10, no. 10, June 1967, pp. 28-32. Also, Luther J. Carter, "Social Sciences: Problems Examined by Senate Panel", Science, no. 153, (July, 1966), pp. 154-156.
5. All of these objectives and other similar ones have given rise to many studies. There is no need to dwell on this. See, for example, Gaston Bachelard, La formation de l'esprit scientifique (Paris: J. Vrin, 1967), 5th edition; William Leiss, The Domination of Nature (New York: George Brazillier, 1972); Paul Starr, "The Edge of Science", Harvard Educational Review, vol. 44, no. 4, (1974).
6. Thomas S. Kuhn, The Structure of Scientific Revolutions (University of Chicago Press, 1970). Also, Senate Special Committee on Science Policy, A Science Policy for Canada, op.cit., vol. 2, (1972), pp. 429-431.
7. Candidates who are eliminated by selection committees use that as an excuse for having been passed over.
8. Jean-Jacques Salomon, Science et politique (Paris: Editions du Seuil 1971) p. 315; OECD, Secretary-General's Ad Hoc Group on New Concepts of Science Policy, Science, Growth and Society. A New Perspective (Paris, 1971), p. 17, pp. 53-55, p. 114; Walter Hettich, "Federal Science Policy and Social Science Research", Canadian Public Administration Review, vol. 14, no. 1, (1971), pp. 113-128; Karl W. Deutsch et al., "Conditions Favoring Major Advances in Social Sciences", Science, vol. 171, (February, 1971), pp. 450-459.

II TYPES OF RESEARCH

Our colleagues have examined at length the various typologies of scientific research, and they echo the concerns of numerous experts who have studied this question.¹ We will mention briefly a few of these typologies. Most characteristics have specific purposes, especially administrative, and in addition, they hardly conform to the conditions of university research, particularly in the human sciences.²

Generally speaking, there are two distinct major categories of research: pure research and applied research. The first bears on the development of theories and methodologies, irrespective of their practical application; applied research utilizes these theories and methodologies in order to rationally and systematically examine empirical problems and their possible solution.

This distinction was originally made in relation to the natural sciences. The distinction in these sciences between pure and applied research is based on two principles. First, some disciplines such as physics are considered "pure" sciences and others, for example chemistry, are known as "applied" sciences. Secondly, within a given discipline, it is usually quite easy to differentiate two logically and chronologically distinct types of research activity: research that seeks to develop theories and methodologies, regardless of their potential for immediate or future application; and research that makes advantageous use of existing theories toward the solution of empirical problems. There is, therefore, the assumption that the two types of research are causally related: the theory logically comes before the application, and reciprocally the questions raised but not resolved during application are useful to the theory and may even serve to reorient it. The time lag between theoretical discovery and application is more or less lengthy but is often easy to determine; this indicates that there is no causal break between one and the other.

Some consider the distinction between pure research and applied research to be fragile since, in the present circumstances, the two types of research increasingly overlap logically and chronologically. Thus, over the last two centuries, the time lag between theoretical formulation and its application has been gradually growing shorter. This time lag has in many cases been so short over the last few years that one must assume at the outset a very close and

logical relation between the two types of research. It has even been prematurely concluded that applied research is nothing more than pure research brought to its logical outcome. Research design and implementation according to new methods, intensification of the multidisciplinary approach and of work in teams, and new theoretical orientations rendering obsolete the traditional divisions by discipline at university (where pure research reigns supreme) combine to reduce the logical and chronological gap between the two types of research.

An advocate of this position, Joseph Ben-David, argues as follows:

There is no reason why some applied research should not be also fundamental research and vice-versa. If a piece of research - whatever its original aim - results in a publication which is a contribution to knowledge and also leads to the solution of a practical problem, then it is both... It would be possible to make a case for regarding all the experimental sciences using statistical technique as merely "applied mathematics"; another equally good case could be made for regarding only physics as fundamental and all the rest applied, and so on and so forth. The only basis for choosing between these viewpoints would be one's personal preferences. Distinguishing, therefore, fundamental from applied research by the nature and the consumers of their products seems to be the only unequivocal and operationally feasible procedure.³

To our knowledge, the importance for the human sciences of the distinction between pure research and applied research has not been assessed. The following question arises concerning this sector of research: can we identify the logical and chronological principles which would justify making this distinction, as is done theoretically in the case of the natural sciences?

At the risk of being considered an iconoclast, it is advisable to ask what specialists in the human sciences mean when they refer to pure research and applied research. We are justified in asking the question whether, strictly speaking, it is possible in the human sciences to distinguish between pure and applied sciences. The more established sciences - psychology, economics, sociology, anthropology, political science and linguistics - undoubtedly have a body of scientific theories or theories that so aspire. Inversely, other disciplines such as education, administration, social work, law, industrial relations and history are oriented more toward the study of empirical questions and may be considered applied sciences.

The situation is not simple. In the human sciences each "pure" science has its own "applied" sector, and the logical links between theory and application are not always clear; such is the case with economic, sociological and

political theories and their relation with applied economics, sociology and political science. Moreover, instead of getting their theoretical elements from "basic" sciences, the "applied" human sciences must often define their own theoretical frameworks. These appear as specific syncretisms of theories emanating from the "pure" sciences; they may even constitute sui generis theories.⁴

In most of the human sciences, it is virtually impossible to subdivide research into two categories, pure and applied, as is done in the natural sciences; the logical and chronological links are tenuous and even impossible to establish. Often in a given discipline, a large number of theories may be considered equally relevant in explaining the same facts; in such a case, questions may be raised as to whether the theories are "pure". Furthermore, if those who work in applied research ignore or indiscriminately adapt the existing "pure" theories to their own needs or devise their own paradigms, it must be recognized that the dialectical interaction of theory and application leaves much to be desired. Moreover, the cases with causal or chronological links between the theory used and the premises and methods of the empirical research are rare. Instead of supporting one another, these two kinds of operations are carried on concurrently. Even more so, industrially developed societies generate serious problems that concern the human sciences to a much greater degree than they do the natural sciences: methods and functions of production, urban congestion, pollution, depletion of natural resources and the bureaucratization and development of the oligarchy of large organizations. The theoretical and applied approach must be combined to deal with these problems.

Thus, as a rule, specialists in the human sciences make the distinction between pure and applied research, but it would be better if they questioned its appropriateness. In the human sciences as a whole, this distinction is justified. However, there is always the risk of missing the major aspects of the nature of these disciplines when this distinction is not closely examined.

To sum up, the distinction between pure research and applied research was first established in the natural sciences. The human sciences have not attained the rigorousness and objectivity of scientific disciplines, which explains the looseness of many of their theories. At the same time, in order

to grow, we believe these sciences will need their own developmental model.

According to some people, the human sciences should search for their model not in physics but in the clinical disciplines and engineering. Similarly, the human sciences cannot claim the degree of universality of physics. Frequently it is by examining empirical cases and specific problems that theories and methodologies are conceived and tested. It is then usually possible to generalize from the empirical data and achieve a certain universality.

Contrary to physics, but like the clinical disciplines, the human sciences seem capable of producing not pure theories for ultimate application but systematic data collections and diagnoses on very complex situations created by society, as well as prognoses and solutions; in fact, these solutions are proposed, not imposed, as a means of affecting causes and symptoms.⁵

It is certainly possible to conduct theoretical research or utilize pure methodology in the human sciences, as it is in physics. However, these theoretical activities do not last long if they ignore the empirical data which they must explain. Furthermore, contrary to physics, a good number of theories in the human sciences derive from empirical research and are in a sense by-products of the latter. Even more so, many of the results of excellent empirical research are not based on theory in the strict sense of the word. In the human sciences it is rarely possible to reconstitute the whole process from theoretical formulation to establishment of the modalities of its application in the form of technologies and innovations - in other words, to follow the process from pure research to applied research to practical results.⁶

However it is perceived, the distinction between pure research and applied research is not essential. The two types of research seem to follow overlapping routes, not easily differentiated.

The most valid research in the human sciences, contrary to physics, seems to be that explicitly conducted for the purpose of acquiring empirical knowledge. B.R. Wilson considers the social sciences as constituting a "praxis," a "practical application," a set of procedures on "the best possible way of conceiving the investigation of reality." This statement may be extended to all the human sciences.⁷

According to our conception of the human sciences, the distinction between pure research and applied research is secondary. We do not entirely disregard

it, since it is part of the orientation of researchers who, depending on the situation, conduct theoretical studies or concentrate on the exploration of concrete cases. For reasons to be outlined later, it is very important that the human sciences consolidate their theoretical and methodological foundations. Moreover, many analysts in the human sciences maintain this distinction on which they partly base their conclusions and recommendations, as is the case in numerous studies conducted for administrative or political purposes, such as the Report of the Senate Committee on Science Policy in Canada. We will utilize this distinction when discussing data pertaining to the research activities of large public and private bodies; the latter sometimes apply these distinctions in preparing their statistics or in funding university research projects.

Among the various types of research, there is also the distinction between "frontier" research and "contemplative" research. "Frontier" research is sometimes considered the only form of original research, because it accumulates and organizes new data, or old data in a new way, and so adds to the sum of human knowledge. The model of the physical sciences is obvious, but it has also been applied to the social sciences.

Contemplative research, on the other hand, is the study and ordering of knowledge which has already been discovered. This form of research, it has been argued, is less original because it does not "push back the frontiers of knowledge," and so it is more appropriately identified with the teaching rather than the research function of universities.

Again we find this dichotomy misleading. "Frontier" research may, at its most superficial, be little more than the use of standard research techniques to assemble new data - administering aptitude tests to a category which has not previously been tested, for example. By the test of rational analysis to understand or identify causal relationships, this may not even deserve to be called research. On the other hand, reflecting on data that has already been accumulated and analyzing it in an original way may be a significant contribution to knowledge. Calculus was a major contribution to research techniques, but it was "discovered" by theoretical mathematicians and not by empirical research; Montesquieu and Bagehot contributed to our knowledge of political systems without doing frontier research. In the human sciences, it would be particularly difficult if not impossible to render operative the distinction

between "frontier" research and "contemplative" research. Therefore, we will not retain this distinction or dwell on this point.

A third way of characterizing research is to subdivide it into "free" research and "mission-oriented" research. Whether funded or not, research is said to be free when it is conducted solely on the initiative of the researcher, and mission-oriented when the formulation of the problem being researched and the various steps for implementation are controlled, in one way or another, by the sponsors. This typology overlaps the first two in that free research and mission-oriented research may be considered "pure" or "applied" or even "frontier" or "contemplative" according to the orientation of their design or formulation. Like the other two types of classification, the latter raises semantic and practical difficulties. We will nevertheless adopt this typology, since it is suitable to our research - the examination of university research.

The main questions raised by university research concern its existing relation with the particular objectives of the university: the preservation, growth, transmission and diffusion of knowledge. The most important question for the university is not whether research is "free" or "mission-oriented".

For the human sciences one should not accept without some examination the relative worth of the distinction taken from the natural sciences between the "scientific community" and the "technocratic community."

In university circles there is concern over the extensive growth of in-house research, research conducted by university scholars, and more particularly research linked to the make or buy policy, as opposed to that funded by independent bodies such as the Canada Council. The questions raised concern the quality of research, the scientific scope of the research topics and the freedom of the scholar vis-à-vis "institutions": protection of his inviolable right to take a critical view of his research topic, to publish his research work, etc. We will deal later on with these numerous important problems.

At this point in our report, it is sufficient to recall some of the essential criteria that apply to any university research. Whether "free" or "mission-oriented" research, the authorities responsible for university research must ask two major questions for each project: a) Is it truly scientific research, that is, a rational analysis of causal or functional relations among phenomena? b) Does the project conform with the orientations of the educational

unit and the teachers concerned?

Theoretically, mission-oriented research is as valid for the university and science as free research. For numerous reasons, however, mission-oriented research requires special attention. Whether governmental "make or buy policy" or a private contract, the sponsor's requirements may interfere with the norms of science to the point of making it impossible to observe the rules of research to which the university can never adhere too rigorously. A great deal of caution is necessary, since mission-oriented research emanating from governments and private bodies is often lucrative for teachers, students and the university, and it could be tempting to conduct research for quite different purposes than the pursuit of knowledge.

It is for practical reasons that we seek to limit the characterization of scientific research to the distinction between free research and mission-oriented research. This distinction will enable us in particular to adopt a definite position on a most crucial issue both at the administrative and educational level: the integration of research in the university setting. In the following chapters, we will discuss the characteristics of university research: objectives, organization and infrastructure.

Notes

1. Of all those who have examined in this way a typology for research, Jean-Jacques Salomon, in our opinion, comes closest to presenting a general synthesis. (See Science et politique, op. cit., pp. 134-156.) Also worth consulting is the Report of the Organization for Economic Cooperation and Development (OECD), The Research System, vol. 3, Canada-United States. General Conclusions (Paris, 1974).
2. See Norman W. Storer, The Social System of Science (New York: Holt, Rinehart and Winston, 1966).
3. Joseph Ben-David, Fundamental Research and the Universities (Paris: OECD, 1968), pp. 17-18, 120. This view is similar to the one held earlier by Louis Pasteur, who believed that there were not two forms of science, but rather science and its applications, these two activities being linked to each other as the fruit is to the tree. (See René Dubos, Louis Pasteur: Free-Lance of Science (Boston: Little Brown, 1950).) Still according to Ben-David, there is only one distinction to be made: the differentiation between research (pure and applied) and development - R and D -, that is between research per se and the practical uses that can be derived from it. This distinction could be very important because as far as it is concerned, research assistance organizations, in particular public and private enterprises, and universities, are at odds. On the one hand, organizations providing assistance want research to yield immediate, practical results (new technologies, innovations, inventions). On the other hand, university researchers, both the theoreticians and the empiricists, must respect logical and chronological rules and constraints and thus naturally tend to proceed with the longer term in mind, or even to disregard time altogether, leaving it to others to "make use" of their work when they wish. Harvey Brooks thinks along these lines, and he concludes that "the line separating science and technology is becoming increasingly blurred". (See The Government of Science (Cambridge: M.I.T. Press, 1968), p. 292.) The Report of the Senate Special Committee on Science Policy quotes Lord Rothschild, who notes that for many people pure science cannot be separated from applied science, then adds: "The latter view believes that the adjectives pure and applied (research) imply a division where none should exist and that their use can be harmful... This view is not easy to understand... It is not, of course, in dispute that the results of pure research may sometimes be of applied or practical value, and that applied research may produce results of 'pure' interest and importance." "The government should, therefore, reject the view that there is no logical division between pure and applied research." Quoted in vol. 2, (1972), pp. 388, 389. Also, Howard Adelman, The University, A Perspective on the Wright Report (Toronto: New Press, 1973), pp. 120-135.
4. This enables us to understand in part why departments of education, administration, industrial relations, social work, etc., are demanding their "own" economists, their "own" sociologists, or their "own" psychologists.

5. For similar points of view, see Joseph Ben-David, "How to Organize Research in the Social Sciences", op. cit. and F. Ronald Hayes, "The Chaining of Prometheus", p. 69; A.B. Cherns, "Models for the Use of Research", Human Relations, vol. 25, no. 1, pp. 25-33; David Easton, "The Social Sciences and Public Policy. The Royal Commission on Bilingualism and Biculturalism as a Reference Point", National Conference on Social Science and Public Policy in Canada (Ottawa: 1975).
6. Karl Deutsch et al. have attempted to measure the time that elapses between the moment when a major contribution is made in social sciences and the moment when its impact on social and political practices is felt. From 1900 to 1965, the average time was 10 years. However, the authors noted that after 1930 there was an appreciable decrease in the time compared to the 30 years before (from 11 to 20 years between 1900 and 1930, and from 8 to 10 years since then). See Karl Deutsch et al., op. cit., pp. 459-471.
7. B.R. Wilson, ed., Rationality (London: Oxford University Press, 1972), p. xv. See also Donald C. Rowat, "The Decline of Free Research in the Social Sciences", Presidential Address to the Annual Meeting of the Canadian Political Science Association (Laval University: June 1, 1976). Rowat writes on this subject: "In the public mind, there seems to be a confusion which identifies scholar-initiated research with 'ivory tower', or irrelevant research. This, I think, results from our having mistakenly imported from the natural sciences the terms 'basic' or 'pure' research, instead of using the terms 'free' or 'independent' research. The public thus think of university research as mere curiosity-oriented research rather than applied research that can be put to any practical value. The Lamontagne Committee (i.e., the Senate Committee on Science Policy) added strength to this impression by using the term curiosity-oriented research as virtually synonymous with university research... Basic as opposed to applied research is almost a meaningless concept in the social sciences because nearly all social science research is applied in the sense that it is aimed at understanding society in order to solve social problems." Jean Boucher comes to the same conclusion: "...still more likely to waste precious time, is the habit of maintaining an artificial distinction between pure and applied science. What is particularly sinister about this kind of discrimination is that it could lead to an opposition between governments, interested only in applied research, and universities, exclusively concerned with pure research (...) These days there is a trend to believe that the difference between fundamental and applied research resides not in the method, subject matter, or even the utility of the research, but in the attention the investigator chooses to pay to such utility. Now nothing is easier than for a researcher to be mistaken about his own motives. We must therefore attribute the obsolescence into which the classic distinction between pure and applied research is gradually falling to the wisdom of scholars and the perspicacity of industrialists. A much more timely distinction is gradually gaining ground, that between free and commissioned research." Jean Boucher, then director of the Canada Council, "The Social Sciences: In Preparation for Take-off", Transactions of the Royal Society of Canada, vol. vi, series iv, (1968), p. 6.

III OBJECTIVES OF UNIVERSITY RESEARCH

Teaching and scientific research are the *raison d'être* of the university, and research is particularly necessary for the development of graduate studies.

The modern university is in a period of change, and if it is difficult to grasp the nature of this change, it is even more difficult to anticipate its results. Our endeavor is made more complex in that research methods and objectives evolve very rapidly nowadays or are reexamined.

Research has been carried out systematically in the university since the establishment of the first graduate programs more than a century ago. However, the university is not the only research institution. Governments, industries and nonuniversity research centres all compete more or less with the university depending on the country; these various agents constantly interface so that changed conditions affecting one of them also affect the others.

The current situation is very fluid, and it cannot be stated with certainty that the university will continue over the next decades to increase its portion of overall research, even of so-called pure research. It may have reached a peak for an indefinite period after 15 years of spectacular growth, and the alternatives it now faces may result in stagnation or even a decline. To understand properly this current process, a great number of developmental factors must be taken into account. Two of the many questions faced nowadays by the university will have a major influence: the general orientations which organizations will give to research and the effects of the probable enhancement of teaching functions on the pursuit of large-scale and long-term research projects.¹

Any change in the relative importance accorded research by the principal institutions conducting it raises the essential issue of quality. For many reasons, at least in North America, the university has been considered for some decades, and still is, the setting par excellence of long-term research whose primary objective is the growth of knowledge. It includes specialists in a wide range of fields and so can pursue interdisciplinary research. It has research aids - laboratories, libraries and a propitious administrative structure. And it has some flexibility, because it is also a teaching institution and professors may be temporarily relieved of some or all teaching duties. And of course, at the graduate level, the students can sometimes serve a useful

apprenticeship by acting as research assistants.

Many research institutes, whose primary aim is the development of knowledge, were established for these reasons within the university, and most of them remain integrated within the latter.

Thus, Canadian universities receive less than 20 per cent of federal research funds, but they share over 60 per cent of the funds allocated to so-called pure research.² This is confirmed by a study of Karl W. Deutsch et al. on the conditions that have contributed to major improvements in the social sciences since 1900; these improvements have been realized mainly through research conducted in the universities, and this trend was even more evident from 1930 to 1965 than from 1900 to 1939.³

In this section as in the rest of the report, we will confine ourselves to the human sciences. In discussions about university research, it is apparent that the conditions under which it is done in the human sciences are not well known. We had to carry out many statistical and analytical studies. Furthermore, university research has been slow to develop in Canada compared with countries like France, Great Britain and the United States, and expansion over the last 15 years has been very rapid and inadequately controlled. These factors have made our task more complex.⁴

Insofar as university research seeks to further knowledge, it pursues objectives that are basically those of any scientific research. These objectives are derived from the strict observance of the rules of science. Does the university deviate from these objectives in view of its own plans and, if so, in what direction? This question may have seemed of minor importance not long ago, but in the last few years it has been receiving increasing attention. Research in the university setting essentially interacts with another purpose of the university, namely teaching.

As long as university research remained subsidiary, was limited to a few teachers and was "visible" only in the natural science departments, relations between teaching and research were simple, the former being quite naturally favored. Very few people indicated they were dissatisfied with this situation. But the former balance between the two has not endured. The growth of university research over the last few years and its generalization among the disciplines of the human sciences, which has accompanied the extraordinary expansion

of graduate studies, has disrupted this balance and has left nothing in its place. On the contrary, the interaction of university research and teaching has become increasingly fluid, and within and outside the university the ensuing state of disorder has been deplored by all. The discussions on this point are very serious and animated, and it is quite obvious that the points of view vary considerably according to the protagonists. Faculty members wishing to be researchers first, teachers, university administrators, civil servants, elected officials and social groups all seem poles apart. Some consider research as not really affected by its interaction with teaching. For others, the teaching function must have priority over the heuristic function, and the objectives and nature of the latter are greatly affected.

We will not avoid the central issue raised by university research. The relations between research and teaching and their effects on research in the university setting give rise to different observations with useful distinctions.

University research, like any research, must not disregard the first objective of the scientific approach in investigating reality, namely, to develop new knowledge. How and to what extent will this objective determine university research? The latter must take into account other major aims of the university, particularly the stimulation of intellectual inquisitiveness among teachers, the training of researchers by directly associating in research both students and professional assistants, the development of problem identification within professional disciplines, the contribution to cultural and social development and the assimilation of teaching.

Among these aims, three in particular appear to influence university research: the contribution to cultural and social development, the training of researchers and the enhancement of teaching.

1. University Research and Cultural and Social Development

In view of the nature of the university, the teacher-researcher has a special responsibility to meet the needs and expectations of society. Unlike governments and private bodies, where the aim of research is generally determined by immediate problems, universities as a rule allow researchers to freely decide on the nature and orientation of their work. This special situation entails particular responsibilities for the university teacher.

Firstly, men will always need to know more about different societies and the nature, origin and developmental characteristics of the ideas upon which civilizations are based. In the case of the human sciences, university researchers will seek to study as thoroughly as possible the questions bearing on humanistic and social values. They are the only ones who can professionally and systematically conduct such pure research. Our era is experiencing a major crisis of values. Unless resolved soon, and here researchers have a unique role, this universal crisis could plunge the world into another dark age.

Secondly, to meet the requirements of their organizations, researchers with public and private bodies must confine their work to the study of certain questions, sometimes to the detriment of essential social needs. Consider, for example, the needs of marginal groups or the long-range problems related to increased industrialization and urbanization. These issues would be ignored and unformulated if university researchers did not deal with them. They alone have the required means and freedom to examine these questions methodically.

Furthermore, only the university setting can allow research to be fully critical. Its researchers are the only ones who have the required resources and freedom to analyze the deficiencies in the functioning and objectives of societies and, in addition, to work at the always urgent task of determining what should exist beyond what does exist. Science always has a normative dimension, especially in the social disciplines and the humanities.⁵

Finally, university research may allow itself the luxury of pursuing knowledge either from a global or comprehensive point of view or through a limited and analytical approach.

Louis-Philippe Bonneau and J.A. Corry have perceived this dimension of university research in their report on research policy in Canadian universities.⁶ They consider, however, that a global and comprehensive understanding is but a simple contemplation of existing knowledge (what they term "contemplative research"); they believe that only the second approach, "frontier research," is capable of leading to the acquisition of new knowledge. On the other hand, the first orientation is the normal way of conducting university research.

The Report of the Senate Committee on Science Policy has already outlined this distinction. Echoing the previously published Bonneau-Corry Report, the third volume of the Senate Committee Report raises this distinction again and

develops it further.⁷ The Report of the Senate Committee, even more than that of Bonneau-Corry, would confine university research to contemplative research.

This distinction seems improper, since we perceive scientific research as the rational analysis of functional or causal relations among phenomena. It is also possible to extend the field of knowledge by applying this rational analysis to the examination of new phenomena.

It seems difficult to make operative the distinction between frontier research and contemplative research, at least in the human sciences. A great deal of work may seem to be frontier research in terms of its purpose, problem setting and approach but does not result in new knowledge; inversely, work that is presented as contemplative research may provide new knowledge.⁸

Those who make a distinction between frontier research and contemplative research far from always provide rigorous definitions. Insofar as this distinction corresponds to the classical distinction between analytical and comprehensive, scientific research in the university would encounter insurmountable problems were it restricted solely to a global and comprehensive approach.

There exists a creative dialectic between the comprehensive and analytical methods. And it is this dialectic that creates the incessant questioning of particular scientific orientations and major scientific breakthroughs. To restrict research to one or the other approach would be to deny the institution where research is conducted any opportunity to contribute fully to the advancement of knowledge. The university has been and remains a special research setting, precisely because both research orientations are brought together in a more constant and pressing manner than in settings which favor mainly specific and analytical research.

Having made these points, we readily agree that only the university provides a proper setting for research from a global and comprehensive point of view. This method of advancing knowledge offers more possibilities of dealing with issues related to cultural and social development than a too specific analytical research that will never attain more than a partial and limited conception of these issues.

2. University Research and Training of Researchers

In addition to its contribution to cultural and social development, university

research - and this is the second aspect whereby the objectives of research are influenced in the university setting - is conducted in an ideal context for training researchers.

According to the statements made about them, Canadian universities take their responsibility for training researchers very seriously. Many reports of the task forces established by the Commission have dwelt on this point.⁹ However, it is at Laval University that the most thorough studies and heated debates have been conducted to date on this issue.

Laval University is rightly convinced of the important role of the university in training researchers, and it appears ready to make this the primary objective of university research. In the appendix of a report of the Research Commission, the Laval task force states the following:

The primary objective of training future researchers and managers required by society constitutes the fundamental aim of the university. To be acceptable to the university, any other objective must be in accordance with this aim and serve to realize it. The first service is to provide society with the necessary scientists and managers in the future, and thus the further training of teachers is sought to ensure a better education for students.

The report of the Research Commission, commented upon and approved by the task force, considers the training of researchers the first function of university research; it perceives a distinction in principle between two types of research - "institutional" and "noninstitutional" research. According to the Laval group,

The first is designed and conducted for the purpose of training students. The second is designed and conducted without any direct link with the training of students and is based on the desire to determine or find an immediate solution to a given problem.¹⁰

A major concern of university researchers must be the training of researchers. The university brings together experienced teachers from all research fields, professional research associates, assistants seeking to master the difficult art of research and students at various learning levels; they are related to one another through numerous organic links. The university is certainly the most favorable environment for training researchers. All the organizations that employ researchers know this, and each year they recruit at the university.

By carrying out this task, the university fulfils one of its main social responsibilities and, at the same time, gains the support of its financial

sponsors. In Canada, as in the United States, university researchers are frequently heard deploring this training, so far given haphazardly with no established program or control over the results. The following are a few observations from Charles V. Kidd:

The interrelated tasks of training and using manpower, strengthening of our total educational structure for the production of scientists and fostering the development of highly talented students are emerging as functions that are as significant to the nation as support of research. The critically important problems of training enough scientists well and of using them well are far from resolved. The support of scientific training provided as a byproduct of support of research has been useful, but fortuitous and not entirely satisfactory.¹¹

Thus, the training of future researchers is an indispensable objective of university research. To acknowledge this is to accept that the general aims of scientific research are affected accordingly. But how and to what extent?

The university contributes to this training in many ways. Some of these have always existed, are utilized everywhere and do not create problems. Thus, nobody can ignore the educational value of regular instruction given to students, including teaching methods and content as well as methodology and theoretical foundations. There are many former students who praise their teachers for having given them, often as early as the undergraduate level, a liking for research and the necessary intellectual tools.

These testimonials from days gone by are sometimes used to argue that the era of great inspirational teachers is past and that, in the university for the masses, the teacher is restricted to the role of instructor, tutor and reader of the student's work. However, in spite of the changes that have occurred in the nature of disciplines and teaching methods, we know that there are today, as there were in the past, teachers who have a marked effect on a certain number of students, as was the case with Innis, Montpetit and Munzer.

Teachers have a second means of providing research training: the supervision of student work, especially master's and doctoral theses. In the human sciences these dissertations are not commonly an integral part of faculty research. Nonetheless, research training is not neglected, since it determines the function of the thesis supervisor and other student work.

The situation is more complicated, however, if students are expected to take part in individual or team research in progress. In such a case, there is a major difference between the natural sciences and the human sciences. In

many sectors of the natural sciences, it seems quite normal for undergraduate and graduate students to have as advisers teachers actively engaged in research and to choose their seminars and thesis topics in relation to the research work of these teachers. A teacher who does not conduct any research may find himself without master's and doctoral students. The situation is usually quite different in the human sciences. Research seminars per se, namely those related to research in progress and contributing to its work, are rare. The same holds true for theses and work assignments. Grants for free research often have rules limiting or preventing the paid employment of doctoral students. In the human sciences, there are other factors that restrict the total involvement of students in the research work of teachers.

Research is not linked as much to the work of teachers as in the natural sciences, where graduate studies are literally research laboratories. Moreover, there are few teachers in the human sciences who conduct research and can also terminate their research within a precise time frame. Besides, they are often ignored by students and even by their close colleagues.

These teachers, who are expected to retain their position, have teaching and administrative responsibilities at least equivalent to those of nonresearch colleagues. In these circumstances, it is not surprising that many of them are not very disposed to act as pioneers and overburden themselves by involving in their work students who are ill-prepared and often reluctant, for fear of being used as "cheap labor".¹² Though this has occurred in certain cases, one must hope that the unfavorable research context of the human sciences will change for the better in the years ahead. There is a need to examine closely the experiences of students who have played an active role in the research of their teachers and have drawn from this research for their own theses or publications.

The Report of Laval University briefly discusses studies conducted in the Faculty of Arts which mention the percentage of theses directly linked to grant-aided research. It is only about 20 per cent, and the most costly projects appear to have trained few students to date, though the concerted action and training program of researchers that prevails in Quebec obliges research teams to provide employment for students. The situation appears to be changing rapidly; if we include recent entries, more than half the theses are directly

related to research undertakings. Furthermore, the report indicates that many researchers have changed direction, and departments are beginning to organize their research with a view to training students. The principal factor of this basic reorientation is the regrouping of research activities within departmental laboratories. Integrated research groups are formed in these laboratories and, according to a report of the director of the economics department, "all graduate students will normally be required to relate their thesis work to that of the research groups, as well as occupy a research assistant position for a given period of time."

The Laval University experience seems to be an isolated case. To date, the value of such orientation in the human sciences is being questioned. Though it is considered normal for research in the natural sciences to contribute to the training of researchers, there is no approval of universities like Laval that tend to make this training the specific objective of university research. Researchers from every discipline at Laval have expressed their concern at seeing what they consider the first objective of research - the production of new knowledge - being treated as an incidental objective. Those who emphasize the training of researchers merely wish to point out the major characteristic of university research: like any other research, it is naturally conducive to the advancement of knowledge. They are reminded, however, that this must be spelled out from time to time.

There is also concern that if universities make this orientation their official policy there will be undesirable consequences. Thus, it is considered risky to assume that the training of researchers as the main feature of university research will not hinder in some cases the advancement of knowledge. Conversely, research undertakings, quite valid in themselves, that can often be conducted only at university may be discouraged if they do not contribute to the training of researchers, either because the conditions for carrying out the research do not allow this or because there are no interested or adequately trained students. In Quebec there is the fear that, if they make this their policy, the universities will amplify certain existing deficiencies in the government program of concerted action and training of researchers; according to the terms of this program, research grants are made only to researchers grouped in a team and employing students. In short, if the training of

researchers is overemphasized, university and government administrators may give more importance to the size of the team and the number of students working on a research project than to the fundamental objective of any research - the development of knowledge.

Thus, it is recognized that the responsibility for training researchers belongs to the university, but as seen in the ongoing debate at Laval, the nature of the interaction between this task and the primary objective of research is far from defined.

3. University Research and Teaching

What type of relations must be established in the university between teaching - usually considered the primary function - and research? This question provokes a many-sided discussion which is even more animated than that concerning the interaction of research and training of researchers.

Stated in its most extreme terms, the problem is whether university research should be conducted in the university only in relation to the teaching of knowledge to students, or should it be continued as research per se regardless of its effect on teaching? Most people who deal with this issue avoid taking one or the other limited position. They consider that there are enough interactions between research and teaching to establish complementary relations between the two of them; in their opinion, the issue has been examined over and over again, and no useful purpose would be served by reopening the discussion.

Nonetheless, we will raise the question again to echo the growing concerns over the last few years within and outside the university and to emphasize often neglected aspects.

Generally, people tend to have a very broad conception of research. Thus, any direct or immediate course preparation (readings, references, course notes for students, course outline, etc.) is called research. When considered to be as broad as this, research does not conflict with teaching. Insofar as the course content and teaching methods of university instruction, even at the undergraduate level, encourage rational analysis among students, this instruction is research training. Reciprocally, research represents for the teacher a complementary activity necessary to enhance his teaching.

If teaching and research are considered two complementary activities,

oriented principally if not exclusively to the training of students, there is no point in opening a discussion on their relations.

On this question of the relations between research and training of researchers, we conclude that the distinctive purpose of university research is the development of knowledge, though it does not disregard the training of students. This same conception of research - rational analysis of functional and causal relations oriented firstly to the acquisition of new knowledge - will guide our examination of the relations between teaching and research. We will therefore place greater emphasis on the constituents of the dialectic, which is more complex than customary observations would lead us to believe.

For many, the teaching function is too poorly valued in the university and, in addition, the status structure and criteria for promotion of teachers favor the research function. Jenkes and Riesman adequately summarize this position with respect to the United States:

...Teaching is not a profession in the way research is. There is no guild within which successful teaching leads to greater prestige and influence than mediocre teaching, nor any professional training program that develops pedagogic skills in a systematic way. Indeed, there is very little knowledge about what teaching strategies work with which students. Under these circumstances it is hardly surprising that a great deal of teaching at both the graduate and undergraduate level is dull and ineffective. No form of success that depends on luck and individual initiative is ever widespread. No doubt most professors prefer it when their courses are popular, their lectures applauded and their former students appreciative. But since such successes are of no help in getting a salary increase, moving to a more precious campus or winning their colleagues' admiration, they are unlikely to struggle as hard to create them as do other things. Indeed, good teaching can be a positive handicap in attempting to meet other payrolls, especially in a place where most teaching is mediocre, for the able teacher finds students beating a path to his door and leaving him little time for anything else. If he is really committed to research, he may well find that the only way to make free time is to remain aloof.¹³

Oliver Fulton and Martin Trow express similar views:

American universities and colleges are, for the most part, intensely competitive: the prize they seek is institutional prestige. Universities, though not undergraduate colleges, have a formal obligation to carry on research and graduate instruction - the two are closely related - and at least part of their regular faculty (at leading institutions, nearly all of it) is appointed with research promise and achievement in mind. And there is plenty of evidence that universities judge themselves, and are judged by others, on the basis of their research productivity. University departments, the institutional arms of academic disciplines, organize graduate training and largely determine faculty appointments and promotions. Insofar as departments accept the preeminence of the research function they are also highly competitive, for a disciplinary prestige which is

partly related and partly independent of the prestige of their universities. Similarly, academic scientists and scholars compete as individuals for personal prestige by research in their discipline though this too is related to and affected by the prestige of their departments and universities.¹⁴

Fulton and Trow base their analysis on the survey of 60,028 American teachers, distributed among those involved mainly in research, in research and teaching and mainly in teaching. They also distinguish among universities, colleges and junior colleges, and they divide the universities according to three levels: high-quality, medium-quality and low-quality; finally, they make a distinction among the various natural and health sciences, the social sciences and the humanities.

Overall, the authors note major differences among teachers according to their propensity for doing research and publishing. Fifty-two per cent of them had not published during the two years preceding the survey and only 3 per cent had 10 or more publications to their credit. Teachers who reported doing mainly research had published two and a half times more than those who were involved primarily in teaching; however, the differences were less extensive in the low-quality universities than in the high-quality ones (79 per cent of teachers involved in research had published in the high-quality universities compared with 57 per cent of teachers in the low-quality ones).

Teachers who indicate they do research publish much more than those involved mainly in teaching, but the correlation is far from perfect. As a teacher moves up in rank, the number of his publications increases; the same occurs with age, though teachers between the ages of 36 and 45 publish slightly more than those between 31 and 35 or 51 and 60 years.¹⁵

The teaching function of faculty is generally less important in the high-quality universities than in the low-quality ones. In the latter, however, faculty who teach more publish less than those who do not teach as much; contrary to this, in high-quality universities, professors whose teaching loads are heavier devote as much time to research as the others.

Especially in the best universities, researchers who are very active in research are much more involved than the others in administrative duties; hence, the conclusion of the authors, "at the high-ranking research universities, research publication is almost a prerequisite for holding power in the institution; elsewhere, there may be other ways to reaching positions of influence."

The authors add:

But there is more to consider than access to power; for our findings clearly conflict with the conventional view of a researcher as isolated in his study or at his laboratory bench. Despite demands on their time which are surely at least as hard to meet as those made by heavy teaching loads, many even of the most active researchers still shoulder an administrative burden - and there is no question that whatever power it brings with it, administering is frequently burdensome and a potential distraction for research activity.

In addition, teachers who do a great deal of research have more graduate students, work more with research assistants, are more often members of research institutes and centres of their institution, publish more, are more involved in consultation and cooperate more closely with scholarly societies. It seems, therefore, that the more extensive the research, the more intensive the activities in the other sectors.

Researchers have a greater opportunity to obtain university promotions than nonresearchers. The salary of teachers very active in research is much higher than that of teachers who are inactive or not very active. In 1969, five times more teachers who were active researchers than inactive teachers earned \$20,000 and over; among the researchers, those who had published a great deal were twice as likely to have a salary of \$20,000 and over as those who had few publications. This leads the authors to comment, "Whether or not the 'publish or perish' mechanism is operating, 'publish and flourish' clearly does."

And they add:

There is no question that publication sharply enhances academic men's chances of high salary - and also of earnings outside the university, whether they are royalties or consulting fees. It is possible, however, that this simple relationship conceals a more subtle one between publications and promotion to higher ranks, on the one hand, and between rank and salary, on the other, and we have seen in reverse that there is a strong positive relationship between current publication and holding one of the professional ranks (especially a full professorship)... In the leading universities, nearly two-thirds of full professors who are active researchers earned \$20,000 a year at the time of this survey, as compared with fewer than a quarter of the 'inactive' full professors, and less than a third of those actively doing research who had not recently published.

And they conclude their analysis in these terms:

If there is a division of labor between 'teaching' and 'research' institutions, there is also another kind that is found among the institutions where research is done. Here we find a difference between the higher-quality universities and the weaker universities and leading four-year colleges. In the former, nearly all regular faculty members are engaged in research activity of some kind and

intensity. Where 70 and 80 per cent of all staff are currently publishing, the division of labor between research and other functions of higher education is one of the time and energy of academic men and women - the conflicts generated by that division of labor are resolved within the men and women who teach and who also do research, consulting and administer those institutions. We find there, in broad terms, that there is no market subordination of one function to the other: those who are most active in research also teach nearly as much as those less active and also do a good deal more departmental and university administration. Some do more than others - but it is more of everything, and the principle obtains, 'the more, the more'. By contrast, in the weaker universities and in the better colleges there is a division of labor within the faculty, between those who do research and those who do not. Our guess is that the former set the norms and values for all and thus influence the climate of teaching as well as of learning throughout those institutions. Nevertheless, it is possible in those colleges and universities to have an honorable and dignified place - that is, to gain tenure and become a full professor - without actively carrying out research... We are suggesting that in the leading (and doubtless some medium-quality) universities, the academic role includes the expectation of continuing research activity; in weaker universities and strong colleges there is the expectation (and acceptance) that the role may or may not include active research work; while in the middle-level and other colleges, research is not a normal expectation of the academic role.

There are no similar studies on the interaction of research and teaching in Canadian universities. We would like to determine whether the differentials noted in the United States among first-, second- and third-ranked universities are found in Canada. In Canada, based on our indicators, six or seven universities are at a higher level than the others, seven or eight are at the middle level, and some 30 others with graduate studies in the human sciences are at the lower level. Would a study distinguishing these three groups of universities point out differences in the teaching and research orientations of teachers; uneven performances among teachers with respect to research and publications; disparities in the teaching and research function with regard to the definition of criteria for promotion, access to positions that carry status and authority, and setting of salary scales?

Based on the remarks made in the institutions visited, most of which correspond to the mid-sized or small American universities, teachers seem to have the same perceptions of research and teaching as university activities and as means of attaining status and authority as do teachers of mid-sized or small American universities. This is pure hypothesis, which only a survey could confirm or contradict.¹⁶

Moreover, we have no data on the actual distribution of teachers in the

three university groups, based on their involvement in teaching and research and the number and quality of their publications. It would be very surprising for teachers at St. Francis Xavier University to publish and do relatively as much research as teachers at the University of Toronto; however, this is only an impression, since there are no studies on which to base ourselves. What is the situation at the University of British Columbia or at Laval? Do all professors have the same teaching load, regardless of the group in which their university is classified? Do all do research and provide consultation? Do all have administrative duties? Is there a "star system" in Canada? If so, does it exist in all universities or only in some, and to what extent is it institutionalized? What are the criteria for considering a teacher a "star"? Is there in Canada the cumulative process in effect in the best American universities, where a teacher does extensive research, publishes and teaches a great deal, supervises many theses, provides numerous consultations and devotes a good portion of time to administrative duties? If so, is this process found in all universities or only the first-ranked ones?

Regarding the human sciences in Canadian universities, our information does not enable us to determine whether teaching is subordinate to research and, if it is, in what manner and to what extent. Many of our collaborators considered this was so and indicated, for example, that the criteria for promotion of teachers favored research over teaching. In addition, others felt that the growth of graduate studies had resulted in depreciation of undergraduate teaching, which they deplored.

The situation varies greatly from one university to another. However, there is not necessarily a negative correlation between the development of graduate studies and the quality of undergraduate teaching. American universities that excel in graduate studies are also renowned for the quality of their undergraduate studies; those whose graduate studies are not quite satisfactory are also inadequate at the undergraduate level. It is possible for universities to be temporarily inclined to neglect undergraduate studies as they devote a great deal of energy to improving recently established graduate studies. If this assumption is correct, there could be serious short-term consequences; in Canada, the six or seven best universities and the eight or nine second-ranked universities are currently making a special effort to increase the extent and

improve the quality of their graduate studies in the human sciences.

Canadian universities are proceeding cautiously, however, as they attempt in various ways to correct whatever could hinder teaching and research. They are seeking to improve procedures for evaluating the work of teachers to achieve a better balance between teaching, research and administrative activities. At the same time, priority is given to qualitative criteria in determining the value of university research.¹⁷ There is an effort to perfect new educational methods that would place greater emphasis on research. As in the natural sciences, the development of educational methods that better combine research and teaching in the human sciences would require costly curriculum reforms, resulting in teachers having to drastically modify their work habits.

The combination of the effects of structural tendencies and attempts to make voluntary readjustments could, in a very short period of time, favor teaching to the extent of jeopardizing the future of research in Canadian universities; apparently, this is already the case in second- and third-ranked American universities. Some of these tendencies relate to the scope of research within universities, which, in the human sciences, very often limit research to a single discipline and maintain research faculty in isolation; yet multidisciplinary research and work in teams are increasingly required in view of the kinds of questions under study.

Other analogous tendencies result from the extraordinary influx of undergraduate students since 1960. These well-organized students have often succeeded in preserving or obtaining resources and energies that could have been directed to graduate studies and research. The influence of teacher unions and, in the last few years, of university administrations have had a similar effect.

Finally, as a result of acute inflation in Western countries and the reorientation of government priorities, organizations providing aid to university research have seen the relative value, even sometimes the absolute value, of their funds reduced in the last few years. Cutbacks in research grants have already affected the rate of university research and, should they continue or become even larger, there would be a major crisis that would hurt researchers and the quality of university activities as a whole.

These tendencies have led to an increase in nonuniversity or para-university research centres in several countries and have prompted various administrations

to conduct their own research.¹⁸ There are visible signs of a similar development in Canada, and even the fearsome slogan "publish or perish" is being replaced by another fearsome slogan, "teach or perish."

These structural tendencies, which are not conducive to the development of university research, increasingly concern teachers, who, while carrying out their teaching duties, look to the university for the assistance they need in conducting their research projects. This explains to a large extent the irritation of many teachers in the face of a number of recent reports on the university, such as the Bonneau-Corry Report, the Wright Report and the Report of the Senate Committee on Science Policy in Canada. The authors of these reports thought they had discovered that Canadian universities unduly favored research over teaching and, to enhance the value of the latter which they considered threatened, they went as far as recommending a reorientation of university research.

All these reports make the same mistake: they base their findings on distinctions which do not take into consideration the distinctions between pure research and applied research, or between "frontier research" and "contemplative research." Furthermore, they assume that only pure research or "contemplative research" may be linked with teaching. In his criticism of the Wright Report, Howard Adelman discredits this position in the following vivid terms:

If these are categories of research, the Commission has made a category mistake. It is as if the surface of the earth were divided into two categories, land and water, and then one term of a second correlative set related to utility is used as a third category. That is, if the surface of the earth is divisible into that which is easily traveled over and that which is not, and then someone states that there are three categories of the earth's surface, land, water and that which can sustain transportation, then a clear category mistake has been made. When the Commission divides research into the equivalent of that which is fundamental and that which is applied (with the understanding that some research will be in both categories, just as some parts of the earth surface, such as marshes, will be both land and water) and that which is related to teaching, a similar category mistake has been made... the question then may be whether or not to finance research if it is unrelated to teaching... We may still want to fund research preferably from other elements in the instructional process, but a category mistake in analyzing the question 'what for' should not be the basis of answering the question, 'how?'. Further, if all research should be related to instruction, and if research costs are separated from other parts of the instructional process, then the relationship between research instruction and other types of instruction may be as crucial as the separation.¹⁹

For many teachers, the authors of these reports have chosen the wrong moment

to lecture them; the authors have underestimated the importance of adverse research tendencies and, by adding the weight of their authority to the already heavier side of the argument, they risk becoming the demolishers of university research. Furthermore, there are many who consider the main criticism of these reports ill-founded, that there has been too great an emphasis in Canadian universities on research per se, to the detriment of its direct usefulness for teaching. The authors appear to have overestimated the possibility of directly transforming research per se into an actual teaching activity at the undergraduate and even graduate level, particularly in the human sciences.

The relations between research and teaching are too complex to confine to simplistic formulae, such as to state that they are naturally complementary or conclude that they are basically in opposition. Many factors must be taken into account: nature and orientation of the research, available resources, teaching methods at the undergraduate and graduate level, raising of awareness of teachers, student expectations, etc.

The quality of teaching is not necessarily assured by placing exclusive emphasis on it. Teaching may sink into routine and conservatism if it is not stimulated and renewed by research. There is another preconception - that those doing a lot of research will teach less and less well. This has never been confirmed in Canada, nor has it been established in the best American universities. It is still quite common to see full professors, who are experienced researchers, teaching first-year students at the undergraduate level. This is a long-established practice which remains very advisable, as long as there is a certain rotation among this category of teachers.

Graduate students in the human sciences are not automatically attracted, for educational and institutional reasons, to teachers doing research - or, more accurately, teachers who have received research grants - as is the case in many sectors of the natural sciences. However, most students in the human sciences seem somehow to choose their thesis adviser, especially at the doctoral level but also at the master's, among teachers who have proved themselves as researchers and whose publications they may have read.

These teachers have, therefore, an extra work load compared with their colleagues in the natural sciences; contrary to what happens with the latter, students in the human sciences do not always choose - far from it - their study

topic in the research field of their adviser. As a result, their work will constitute only a very indirect contribution to their adviser's research.

This is the indication that the human sciences differ from the natural sciences and have not completed their development as disciplines. However, this situation seems to be changing gradually. Institutions are providing stronger incentives, and organizations that fund research are beginning to feel the need to award fellowships to students writing their thesis and to show more inclination to award funds to grant-aided researchers for students whose thesis topics directly relate to their own research. This channel must be quickly expanded, since it is beneficial to both students and research faculty, and consequently to graduate studies in the human sciences.

If the quality of teaching at all levels is not satisfactory, as is stated in various milieux, the fault does not necessarily lie with the so-called excessive emphasis placed on research. To believe that any change in a given activity affects another activity to the same degree but in the opposite direction is to apply naively the principle of communicating vessels. The effect may possibly be less direct and, in some circumstances, the changes may result in a positive effect. If there is a correlation between the two types of activities, we are more inclined to think it will be positive at least in the best universities, as is the case in the United States.

Universities are just beginning to recognize that research in the human sciences is a specific, valid activity. This activity needs to be valued more by administrators, students and teachers. Consequently, it would be irresponsible to indiscriminately make research the scapegoat for deficiencies in teaching. It seems therefore, that research in the human sciences has not yet attained the status it deserves in Canadian universities.

Consider the method of faculty recruitment: in the human sciences, appointment is often based on teaching skills first and foremost at the undergraduate level; then, potential contribution to graduate studies is explored very subsidiarily; research skills generally are not even considered.²⁰ This practice hardly encourages the development of graduate studies and is not likely to lead to an excess of research activities! This needs to be corrected if some teachers are to be recruited and promoted mainly on the basis of the quality of their research and publications, without the requirement that they

teach specific undergraduate courses. Besides, there are many eminent researchers who have exceptional skills for training researchers but who may be incapable of teaching traditional courses.

In addition, the tendency to discuss relations between research and teaching from the individual rather than institutional point of view restricts the debate to very general considerations. It is by focusing attention on units like the department or discipline, or the research centre and multidisciplinary team, instead of individual teachers, that a prospective balance between teaching and research may be conceived. Only such an approach, which focuses the problem at the level of organic links between teachers and students, may lead to an accurate assessment of the situation. Moreover, this could ultimately enable the necessary readjustments in the relations between teaching and research.

This organic rather than atomic conception of the relations between research and teaching would be inadequate if all teachers were thought to have identical skills and were seen as all pursuing the same activities throughout their professional career.²¹

We seem to be taking for granted that the vast majority of teachers are fervently pursuing research activities in the strict sense of the word. The American studies already cited indicate that this is not the case. The only research project that most teachers bring to a successful conclusion is their doctoral thesis (here again, in the human sciences, a large proportion of teachers - more than 50% in some universities - do not have their PhD). Only a very small minority of teachers actually publish and do research. It is therefore surprising to note that universities start from the assumption that all teachers have the same disposition and energy. Contrary to common belief, the rule of the lowest common denominator prevails in many universities; first-rate teachers and researchers who are ill-appreciated hardly have the opportunity to distinguish themselves from the mass of mediocre teachers and "amateur" researchers and thus to make their imprint at the university.

There is also in the universities a monolithic conception of a teacher's career which is detrimental to the establishment of a creative dialectic between teaching and research.

There may be, of course, certain teachers who distribute their time and

interests evenly between teaching, research and administration throughout their professional life. Very often, though, this is not the case. Circumstances, the requirements of their disciplines and their own changing interests lead many to emphasize sometimes teaching, sometimes research and sometimes administration. Universities and departments must allow teachers to formulate career plans and help them realize these plans. The pursuit of the university's general objectives will be better ensured, since all teachers, at whatever stage of their career, will be engaged in the kind of activities which they prefer and which contribute most to the program as a whole as well as to the quality of their unit.

Such a perception of the teacher as part of an organic whole and having - at least in theory - a diversified career plan can enable professors to draw maximum benefit from sabbatical leave²² and special programs like appointment to the research faculty.²³ Often, because the conditions of these programs are automatic, and for other reasons, the units within which teachers function are insufficiently involved in the process; in addition, these conditions do not take into account the career plan of teachers. Such sizable investments are often limited simply to offering teachers a pause in their professional life instead of allowing them to focus attention on a given research project or a reorientation of their teaching, which they may have desired for some time.

Teachers in the human sciences often complain of too little time for research. They especially deplore that research, which often attracts students from many areas of study, is not considered one of their specific functions. Yet this is not the case with administrative duties. Each passing year, these duties become more demanding as a result of the growing bureaucracy of general services and, especially, of basic units such as departments. A teacher who chairs a committee considered important by the administration may sometimes be given a reduction in teaching load. The indifference of departmental administrators toward research forces research faculty to work overtime without pay at night, on weekends and during their holidays.

More recently, there has emerged yet another source of concern for the few teachers who do serious research and publish regularly. As a result of financial cutbacks, the initial reaction of university administrators is to increase the teaching load of all professors so as to reduce the number of

faculty and thus lower expenditures. Many American universities are doing this, and Canadian universities seem ready to follow suit. Some teachers, especially those who have no interest or aptitude for research, can certainly teach more without inconvenience to themselves or the scientific community. But if the teaching time of all professors, whether researchers or nonresearchers, were to be increased, research would be seriously compromised as would Canadian graduate studies, particularly in the human sciences where programs are barely established. Universities must embark on a totally different course of action if they plan to enhance the value of graduate studies and research. An excellent research faculty member should not have a greater teaching load than an administrator. In some university departments, a teacher engaged in important research work is relieved of some of his teaching. This equitable approach should be generalized. Under the so-called "research faculty" program, some universities relieve a researcher in this fashion for a year or two; this practice, usually quite restricted in scope, must be closely monitored.

Research faculty who publish regularly have many other grievances. They deplore that administrators, students and their nonresearch colleagues minimize the difficulties of their work and that their institution does not give them the necessary assistance. Furthermore, even if the results of their efforts are rarely up to their initial expectations, they have the moral obligation to publish their research, and this is often a very stressful situation for them. This may discourage even the most promising and experienced researchers. How many research careers are blighted by lack of university support?²⁴

There are many considerations in the search for a balance between research per se and university teaching. In addition to the problems of "mass" universities, growing professionalism of research, new expectations of students, society and particularly governments, there are the cutbacks in research funds as a result of inflation and changes in government priorities, all of which makes the situation of research faculty quite uncertain.

In the present circumstances, at least in the human sciences, it would be ill-advised to curtail or redirect university research on the pretext of enhancing teaching. To our knowledge, existing university research in the human sciences is not an obstacle to the quality of teaching. On the contrary, it probably needs to be enhanced in this sector. And less research would not

mean better teaching.

To continually improve teaching and research is also to spell out the links that connect these two activities, while at the same time recognizing their particular requirements and constraints: the diffusion of knowledge in teaching and the development of knowledge in research.

Officially treating them as equals would make it possible to set similar norms with respect to promotion, status, authority and remuneration; each teacher could determine his orientation on the basis of his aptitudes and interests, preferably within teaching or research, and without fear of discrimination. Only the criterion of quality would determine the best teachers and the resultant distribution of bonuses based on output.

Notes

1. See, for example, Dieter Berstecher et al., L'université de demain, (Paris-Brussels: Elsevier-Sequoia, 1974); Stephen D. Kertesz, ed., The Task of Universities in a Changing World (Notre Dame: University of Notre Dame Press, 1972); David Riesman, "Thoughts on the Graduate Experience", Change, (April, 1976), pp. 11-16.
2. The amount allocated by the federal government for pure research represents 25 per cent of the total federal assistance for research. We will come back to this point later on.
3. Karl W. Deutsch et al., "Conditions Favoring Major Advances in Social Science", Science, vol. 171, (February, 1971).
4. On the problems caused by university research in Canada being overdue, rapid and uncontrolled, see OECD, The research System, vol. 3, Canada-United States. General Conclusions (Paris: 1974), p. 54 et seq., p. 186 et seq.
5. See the Report of the University of Toronto Task Force. Also Paul Starr, "The Edge of Social Science", Harvard Educational Review, vol. 44, no. 4 (1974).
6. Louis-Phillippe Bonneau, J.A. Corry, Quest for the Optimum, Association of Universities and Colleges of Canada, (Ottawa: 1972), vol. I, 207 p.; (Ottawa: 1973), vol. II, 67 p.
7. Senate Special Committee on Science Policy, A Science Policy for Canada, (Ottawa: 1972), vol. 2, p. 377 et seq. and (Ottawa: 1973), vol. 3, p. 793 et seq.
8. Guy Rocher objects to the loftiness of this distinction which seems to him to create a gap between those who touched off scientific revolutions (Darwin, Marx, Freud, Einstein) and those, much greater in number, who devote themselves to furthering research on existing paradigms. Hence ordinary research is disparaged, and yet, according to Rocher, it is the lot of most researchers. He comes to the conclusion that this disparaging attitude is particularly harmful in the humanities where research is almost inevitably an "enlightening" and "disturbing" critical reflection. See Guy Rocher, La recherche, l'enseignement, les études supérieures et les humanités, AUCC, Conference, (1972), p. 107.
9. See the Reports of the Task Forces of the Universities of Alberta, Toronto, Montreal, and especially Laval. Concerning Laval, besides the Report that its Task Force presented to the Commission, we have learned about the working paper prepared by Mr. Ludovic Ouellet, Chairman of the Research Committee on the Organization of Research at Laval University, as well as the Report entitled L'organisation de la recherche à l'université, prepared by the vice-rector for teaching and research, Mr. Jean-Guy Paquet.

10. Report of the Laval University Task Force, pp. 54, 56.
11. Charles V. Kidd, American Universities and Federal Research (The Belknap Press of Harvard University Press, 1959). quoted by Bernard Barber, Walter Hirsch, ed., The Sociology of Science (The Fress Press of Glencoe, 1963), p. 413.
12. We have no information concerning professional assistants and research associates, which is unfortunate as there are many of them and their work on a research project, for which they are remunerated, should normally provide them with the opportunity to round out their training. We are interested in knowing what sort of relationship they have with their research supervisors, and also to what extent the departments and research centres guide them, treat them as professionals, and help them if they wish to use their research as a springboard for a PhD thesis. And what happens to them once their work is finished? We are under the impression that, in the human sciences, universities have a long way to go to provide their assistants with a favorable environment for training as researchers. If such is the case, it is high time to remedy the situation. As for post-doctoral programs, which are essential to the training of researchers in the natural sciences, they are practically nonexistent in the human sciences. In addition, there is the special category of research technicians. There are many of these technicians in the natural sciences and also in the human sciences; they have research skills but not the imagination or intellect or drive to conceive and carry out original research projects. These technicians are not required to hold PhDs, but the university must grant them a status (tenure, etc.) that enables them to do their job.
13. Christopher Jenkes, David Riesman, The Academic Revolution (New York: Doubleday, Garden City, 1969), p. 531. For more data, see Part One, Chapter III, University Professors.
14. Oliver Fulton, Martin Trow, "Research Activity in American Higher Education", Sociology of Education, vol. 47, no. 1, (1974), pp. 29-73. Also, A.M. Cartter, "Assessment of Quality in Graduate Education", op.cit.
15. On the importance of factors such as sex, age, etc., see Frank Clemente, "Early Career Determinants on Research Productivity", American Journal of Sociology, vol. 79, no. 2, pp. 409-419. According to the results of the study led by Clemente, only age at first and publication before PhD emerged as important predictors of productivity. On the whole, contrary to an accepted view, university professors do not publish much. According to an American study, 85 per cent of PhD holders never publish anything again after receiving their doctorate; their thesis constitutes their only published work and is most often presented in condensed form in one or two articles. Another study shows that 20 per cent of doctorates publish now and then, and 10 per cent regularly; according to their peers, only 1 per cent of those who publish make important contributions in their field. See Ann M. Heiss, The Preparation of College and University Teachers (Berkeley: Center for Research and Development in Higher Education, 1968) and P. Wooding, "The Profession of

College Teaching", The Journal of Higher Education, (May 1960), pp. 280-282. Also, Michael Brennan, "A Cannibalistic View of Graduate Education", Proceedings of the Ninth Annual Meeting of the Council of Graduate Schools in the United States, (1969). As one dean from Laval University told us, "many of those who claim to be researchers are only amateurs".

16. People have told the Commission how much they deplored the fact that the criteria for promotion were too often closely linked to administration. Thus, associate professorships are granted to people simply because they have become department chairmen. The chairmanship usually lasts only three years, six at most, and the professor is usually promoted for life. Promotions should be made only if the professor promises to complete a doctoral thesis, or according to the quality of teaching and research, or based on the two criteria combined.
17. Some of our task forces are taking into account these trends. Similar efforts are being made in the United States. See, for example, The American Academy of Arts and Sciences, The Assembly on University Goals and Governance, (1971), p. 16 et seq.
18. See OECD, The Research System, vol. 3, Canada-United States. General Conclusions (Paris, 1974), pp. 193-196; Le Colloque de Saint-Paul-de-Vence, Science et Société (Paris, 1973), p. 62; The American Academy of Arts and Sciences, *ibid.*
19. Howard Adelman, The University. A Perspective on the Wright Report. (Toronto: New Press, 1973), pp. 120-121.
20. The emphasis on teaching at the undergraduate level, mainly in first year, has resulted in a branching out of skills into a multitude of sub-fields within the different disciplines. Universities attempt, often under student pressure, to "cover" the greatest possible number of subjects, with only one course and one professor per subject. In actual fact, an excellent program at the graduate level requires a small number of sub-fields, chosen according to the requirements of the discipline, the total possibilities of the institution (the importance of related disciplines, the holdings of the library, etc.) and according to external conditions (how near the university is to strong public or private enterprise, and market requirements, etc.). It is the sum total of these conditions, and not the yearning after past greatness, or the unjustified ambition of a few undergraduate professors that should determine what "major trends", as they are called in Quebec, will be chosen.
21. The type of study we have in mind would be two-fold, partly individual and partly institutional. This type of study would thus be different from the one mentioned above, as the latter was strictly individual. Furthermore, we would propose that the study cover a period of 20 to 25 years, instead of only two years as in the American study, which caught a glimpse of only one stage in a career. It is the entire career of a professor that should be studied.

22. There are rules governing sabbaticals in all universities, but they differ a great deal from one university to the next. If we start from the assumption that the "trainer" should also be "re-trained" every once in a while, and that this refreshing will be as profitable to the university as to the person in question, we come to the conclusion that sabbaticals should be compulsory for all, but without being a financial burden for professors. At Laval University, professors, whether or not they hold fellowships, must neither profit nor lose financially because of their sabbatical year; this rule should be extended to all universities.
23. A program for professor-researchers has been set up at some universities, notably at Laval. According to its terms, professors who have proven themselves as researchers can be freed, with the permission of their departments, from teaching and administrative jobs for one, two or three years, as the case may be, in order to devote themselves to research. This program is a very promising initiative, as it fits within the framework of the institution and, at the department level, takes the needs of teaching into account.
24. For a similar presentation, see David Riesman, "Thoughts on the Graduate Experience", Change, (April 1976), pp. 11-16.

IV ORGANIZATION OF UNIVERSITY RESEARCH

We will deal with the inherent problems of the organization of university research from three different angles: research structure, individual or team research and research infrastructure.

1. University Research Structures

We are faced here with conflicting views. Many say the university is the ideal setting for research, and many claim that university research is poorly organized.

Joseph Ben-David has shown that the university provides a much better setting for research than do autonomous institutes. In a major study on biological and medical research, he compares four countries: France, England, Germany and the United States; the first two have chosen to focus research activities in institutes separate from the university, while the other two have left these activities to the universities. Though France and England were initially ahead in the first part of the 19th century, Germany and the United States took the lead in 1830 and 1890 respectively, and this lead soon became insurmountable. Ben-David considers the university environment as more favorable to research than the independent institute. Many observers, whose remarks apply to all research activities, arrive at the same conclusion.¹

Among the main reasons cited for the superiority of the university are the following: the university provides a regular, adequate livelihood for researchers and is the only environment that systematically trains future researchers. In addition, it protects the freedom of researchers and offers a better guarantee of quality than the independent institute or the government and industrial laboratory.

Research in the university environment also avoids much of the stress associated with failure. A.H. Cottrell states this as follows:

The people at the laboratory bench also have their problems. Except when you are fortunate enough to be riding a wave of success, full-time research day in and day out can be a nerve-racking business. There is a tendency to feel that you have not justified your existence when your experiments fail to come off and your theories are proved to be wrong. Worrying about such things takes the joy out of research, and in the end spoils the research by forcing it into timed channels where a mediocre success of sorts is made certain. The universities have an elegant solution to this problem - there, a man is expected to do both teaching and research, about half his time each. He makes his reputation by

research, but makes his living by teaching; the solid, reliable load of his teaching duties assures him of his value to the community and liberates him from anxieties that can chill the work of the full-time professional research scientist.²

This remarkable performance of university research seems to have continued, if not expanded, throughout the 20th century;³ yet the organization of university research is strongly criticized in all quarters. These criticisms must undoubtedly be considered in the larger context of the questioning over the last few years of the university as a whole, particularly of graduate studies and research. Though the situation of university research is not disastrous, it is certainly far from perfect. Let us briefly see what this is about.

The organization of university research is modeled essentially on that of graduate studies, which have been discussed earlier. Thus - and this applies to curricula - departments, research centres, faculties of graduate studies, research committees and the vice-presidents for academic affairs and research provide the framework for university research in the human sciences, as in the natural and health sciences.

What we have said about curricula applies as much, if not more, to research. The organization of university research is too complex and compartmentalized. It hardly allows for the careful consideration of research orientations; it leads to an unwieldy bureaucracy which uses a substantial portion of the research funds and whose personnel take much of the office space that is often limited and could be used for research purposes. The bureaucracy slows decisions; it emphasizes quantity to the detriment of quality; it results in a plethora of committees which waste the already limited time that could be given to research; in short, it culminates in endemic irresponsibility. Notwithstanding this apparent over-organization, the absence of organic links to permit exchanges among researchers is deplored. And there are few universities with proper structures to evaluate projects which they directly help to carry out.

The unwieldiness of the central administration and the chronic "meetingitis" of departments aggravate the state of confusion of university research, and this is confirmed by our studies and interviews. Over the last few years there have been many internal studies commissioned to propose corrective measures. However, the inertia and general scepticism toward these proposals neutralize any desire for reform.

Most of the reports of our task forces and disciplinary studies deal with this question, but only in a very general way. There is no evidence of marked dissatisfaction. Only minor readjustments seem necessary to eliminate the deficiencies noted.

The reports of the University of Montreal and especially Laval University contrast with the others. The Laval report is worth summarizing since, here as elsewhere, it accurately reflects the official orientation of this institution. The Committee on the Objectives of University Research, state the authors, suggests that the usefulness and efficiency of a research structure should be evaluated in relation to three questions: 1) Does the structure make it more profitable for students at university and does it facilitate the direction and pursuit of research? 2) Does the structure create a research environment that incites researchers to creative activity? 3) Does the structure make maximum use of the available resources?

The report states the research framework as including the department, laboratory, centre and coordinating committee and indicates how these structures should function. It cites and endorses the following view expressed in the 1969 report of the Special Committee on Advanced Studies and Research of the Faculty of Arts:

The 'système D' (individual resourcefulness) cannot continue to meet the requirements of research. It is also unable to establish a research policy and ensure its continuous development. It carries within itself the seeds of destruction. Its deficiencies are known: it drives some discouraged researchers toward any grant-aided research ..., it prevents the organization of research on solid foundations, it confines teachers to expedient and second-quality research activities, it restrains the training of students and makes it impossible for research and advanced studies to thrive by osmosis.⁴

Many will readily agree with this point of view but, based on what we have heard and read, few will be inclined to take action for fear of seeing established a "structuritis" that would kill the "spirit." Even at Laval, the research framework is not as rigid as documents would lead us to believe, and the efforts to institutionalize research as a whole often meet a great deal of resistance.

Overall, except for the rhetoric of official documents and organizational plans on paper, administrators, teachers and students appear to make the best of the existing situation and, if they had to choose between an extensive reorganization or "laissez-faire," they would more willingly opt for the latter. Those who are really interested in the organization of research realize very rapidly that it is an integral part of the overall university organization, as

in the case of Laval; therefore, the organization of research can only be understood in relation to that of the university as a whole.

In these circumstances, any project of universal reform of research structures would certainly be rejected as unsuitable by all universities, except the one where the project originated.

For example, though research centres encompass a good portion of the research at the University of Toronto, this formula cannot be used as a model for all Canadian universities. Other formulae have been chosen elsewhere which are more consistent with the overall organization, and the creation of quasi-autonomous research centres like Toronto's would raise serious problems. The same applies to the so-called bi-dimensional formula that separates curricula from the administration of human and material resources: the curricula are the responsibility of "modules" and administration that of departments. The University of Quebec in Montreal and, to a lesser degree, Laval University have adopted this method of organization, while other institutions do not see any advantage in it. Thus, what appears suitable in one case is quite unacceptable elsewhere.

We have no particular reason to believe that certain methods of organization of university research are better or worse than others. In spite of findings that are usually quite unconvincing, the periodic review of the organization of graduate studies and research seems to be a part of the university ritual. It has the advantage of bringing out the particular requirements of research and, sometimes, enhancing its status.

One particular point needs to be discussed, that of the most conducive structures for multidisciplinary research. The reports of our task forces are unanimous in considering that the major issues of researchers are multidisciplinary: socioeconomic development, analysis of government policies, housing, unemployment, poverty, education. They also note that the structure of departments is likely to favor disciplinary research, while research institutes and centres tend to encourage multidisciplinary research. In its study of the organization of research in Canada and the United States, the OECD confirms this view and makes a number of relevant observations on the organization and operation of university research centres:

The research system in the United States (and Canada) is such as to favor

advanced disciplinary research. The criteria of evaluation, promotion, reward and formal and informal sanction have reinforced this tendency. A researcher often considers his stay in a research institute as temporary, so much so that his departmental affiliation orients his activity in this institute. Consequently, the same splits and divisions that characterize the university are re-created within the research centre. Economists find themselves among economists and do economic research on the economics of poverty; sociologists are among sociologists and do research on the sociology of poverty, etc. Better to say that the interdisciplinary approach is, in many cases, nothing more than a number of disciplines working concurrently under the same roof.⁵

Our colleagues have also identified many other deficiencies in research centres: difficulty in overcoming departmental barriers to promote the creation of these centres, predominance of a discipline over all the others, extent of resources required for their operation, virtual impossibility of abolishing a research centre once established, even if it is clearly useless, danger of establishing "cliques" or "empires" that benefit only a few, etc.⁶

Many people consider that research institutes and centres have their *raison d'être* in universities despite their deficiencies. These centres provide a very good setting for research and ensure its continuity, which is an invaluable advantage. As long as university research is conducted in isolation, it will retain its ephemeral and aleatory nature. Thus, essential projects are abruptly interrupted following the departure or reorientation of the principal researchers. The training of researchers and the development of knowledge are also seriously compromised. Contrary to this, the research laboratory or centre carries on beyond any one individual or group and ensures permanency and continuity. This single advantage seems to justify the existence of research centres, especially in mass universities that have become very heterogeneous and too bureaucratic, the affliction of aging organizations.

2. Individual Research and Team Research

Judging by the reports of our task forces and disciplinary studies, Canadian teachers in the human sciences, contrary to their American colleagues, are not very concerned about the respective value of individual research and team research. Even allowing for a probable gap with the United States, this apparent lack of interest is surprising, given the considerable number of team projects, many of which are funded through grants. We have noted quite frequently some suspicion, even contempt, toward the research work of large teams. Their work

is accused of being elementary since it is impossible to "think" in a group; at best, they will discover but a few "facts." The expenditures incurred are therefore thought to be unjustified. If they go beyond the facts and acquire a theoretical dimension, it is said to be the result of one person, for example, the team director, not following the rules of the game and imposing his particular view on the other members.

Teachers in the human sciences remain basically lone workers. They continue to consider that "major" ideas can only germinate from the reflections of the solitary thinker. The computer and other means recently made available to researchers encourage and sometimes require work in teams. Whether through ignorance or lack of goodwill, these teachers see them as merely technical instruments, only useful in facilitating quantitative operations. (Even if this were the only possible use of computers, one would have to admit that they constitute a remarkably efficient instrument for many operations.)

Wilson Record, an American sociologist, is very much in favor of individual research. After briefly mentioning the presumed advantages of team research (such as the ability to deal with complex and multivariable phenomena beyond the reach of isolated researchers), he draws up a list of potential criticisms of team research. This list is lengthy but it accurately summarizes the most common observations also heard in Canadian universities:

- 1) The superior value of "team", as opposed to individual research, remains to be demonstrated on its merits, this apart from other dangers and limitations to which I have referred.
- 2) The "team" type of research frequently forces the sociologist to engage in inquiries not for testing original hypotheses, but to make maximum utilization of research staff and equipment which might otherwise be idle.
- 3) The processes that operate in the selection of "team" research projects lead to a neglect of relevant problems, not because of theoretical or methodological considerations, but because of institutional needs.
- 4) The selection of "team" research personnel makes for commonality and "inbreeding" that have serious implications for the advancement of sociological knowledge, a product in part of conflict on the intellectual plane.
- 5) The "team" approach to research is conducive to intellectual flabbiness, since the project comes to represent a compromise of individual ideas and a consensus arrived at under forced draft to participate in the group and to keep the machinery rolling.

- 6) "Team" research leads to the fragmentation of sociological knowledge, since it tends to bring together narrow-gauged, and possibly narrow-minded specialists, each of whom pursues his particular line without knowing, and perhaps not caring, about the direction in which the whole is moving.
- 7) A corollary of this proposition is that the individual is discouraged in attempts to formulate comprehensive and integrated views of the discipline; instead, a premium is placed on his becoming an academic assembly-line man.
- 8) Institutionalized research in this form leads to undue emphasis on quantification in sociology since: a) Staff and equipment cannot at times be otherwise employed and there is pressure to justify the continuing overhead; b) Rigid quantification provides a protective "team" and institutional coating whereby relevant findings are underestimated and technique is overemphasized; c) There is pressure to duplicate operations of other research groups having similar structures but quite different subject matter which does require a high degree of quantification; d) Quantification may become primarily a public relations and business-drumming device since it can be employed to convince the uninformed, but influential, that research must be significant because it involves mathematical operations; e) Statistical manipulations can become a substitute for rigorous intellectual endeavors, obscuring simultaneously the fact that thinking in the final analysis takes place in the sociologist's mind, and that he rather than the statistical principles or the machines is responsible for what he does or doesn't do. (Perhaps this is not unrelated to the fact that sociologists no longer write books on broad sociological theory. Instead, we get out collections of "readings in theory", with the editor's interspersing comments that are supposed to make the individual offerings hang together in some coherent whole.)
- 9) "Team" research is a relatively easy means of escaping individual intellectual responsibility, enabling the researcher to pass the buck to other members who, in turn, can pass it back to him, while the critic can never identify the culprit. Or, it enables the researcher to lodge failure in the group as a whole. In any event, responsibility is hard to pin down.
- 10) Finally, the whole process leads to a pattern of inquiry which insofar as it is institutionally "safe" may be to that degree sociologically insignificant.⁷
- This question of the respective value of individual research and team research can also be addressed to specialists of the natural sciences. For numerous reasons, there are always lone scientists. As a result, however, of the revolution in methods of work over the last 40 years in the "applied" and "pure" sciences (mathematics, chemistry, biology, metallurgy and electronics) with the exclusion of only a few fields, scientists must increasingly integrate the international system of scientific communication and regroup within research centres. A.H. Cottrell states this as follows:
- This is an age of research teams, big laboratories, international research

projects. New ways of estimating scientific capacity appear. Mutterings are heard about the "non viability" of those unfortunate research groups in outlying places, too isolated to keep in touch with the frontier and too small in numbers to make any part of it their own. The large laboratory, the big project, the stacks of research reports, the breathless letter-to-the-editor, the international conference; all this is bustling modern "city-science", something far removed from the quiet contemplation in a country orchard. We may not like it, and some of the rarest spirits shy away from it altogether, preferring to find some quiet, unfashionable corner of science. But it is undoubtedly here to stay: it is having to be such an effective way of creating science... The big projects and great laboratories are gradually leading to a new kind of creativity in science. By pooling their individual talents and efforts in a common purpose, the members of such organizations are able to attempt new ventures with a boldness and on a scale far beyond the scope of the individual. It is a creative creativity...⁸

Team research is not widespread in the human sciences, but we believe it is gaining ground on individual research, at least in the social sciences. This is the finding of Karl W. Deutsch et al. in their study on the conditions of the major advances of these sciences. The authors state:

Individual researchers produced nearly two-thirds of all major advances over the entire period 1950-1965, but our study indicates that their share declined from about three-quarters of all contributions before 1930 to less than one-half thereafter. Teams of social scientists, by contrast, increased their contributions from less than one-quarter before 1930 to more than one-half thereafter. Teams of social scientists seem likely to be the main source of major advances during the next decade, but individual social scientists operating in the traditional "great man" or "lone wolf" style will continue to be a significant, though secondary source of new ideas.⁹

Wilson Record, a critic of team research, notes with some bitterness that this form of research is constantly gaining ground, at least in sociology:

It has become commonplace in sociology to observe that the "days of one-man research are over..." Craftsmen in our field can hardly be unaware of the intrusion of mass production methods in sociological research. Now it is easier for a "team" of sociologists to secure a grant of \$100,000 for a collective project than it is for each member to obtain \$10,000 - or even \$5,000 - for unrelated individual undertakings. Indeed the merits of proposed research are judged largely by two criteria: the cost of the undertaking and the number of participants - the assumption seems to be that the greater the amount spent and the larger the number of people involved, the higher the quality of the research effort.¹⁰

The preconceived notion of low cost research in the human sciences maintains the myth of solitary research.

This way of seeing things is increasingly inaccurate. Individual and collective research in the human sciences have become increasingly costly in the last 40 years, a tendency more marked since 1960. Karl W. Deutsch writes

the following about the social sciences, whose expenditures are probably greater than the humanities:

The perception of social science work as cheap - a notion that is widespread among laymen and some university administrators - seems based on the experiences before 1930, when only one-fourth of all major social science contributions required major amounts of capital. Since 1930, more than three-fifths of all contributions have required relatively large amounts of capital, particularly for survey research and large-scale tabulations, and this proportion seems likely to increase in the future. If explicit quantitative results are desired, the requirement for capital support becomes still stronger. Low-budget research, the work of lone individuals, or work on nonquantitative topics may play a smaller and smaller role - the industrial revolution in the production of knowledge has not only reached a large part of the natural sciences but has reached the social sciences as well.¹¹

In his review of articles published in American Economic Review, American Political Science Review and American Sociological Review, Herbert Jacob comes to the same conclusions as Karl W. Deutsch et al. From 1930 to 1968, the percentage of articles resulting from grant-aided research published in these three scientific journals went from virtually zero in 1930 to between 22 and 43 (according to the journal) in 1960, and between 57 and 72 in 1968. Jacob also notes a corresponding rise in team research in relation to individual research.¹²

There are some persistent illusions. Witness the still very widespread illusion that individual research in the human sciences takes precedence over collective research and generally produces better results.

How can one explain this long-standing belief which is widely contradicted by the facts in the United States and, undoubtedly, also in Canada? This belief is deeply rooted in the conviction that the human sciences have not yet attained the necessary maturity to make team research profitable. David Easton asserts:

...We have tried many ways of reassembling the analytic knowledge from the various social disciplines. Multidisciplinary training was once thought to offer a solution... We have tried putting together teams of social scientists in the hope that they would be able to pool their knowledge and apply it to the total problems of society. But experience shows that the disciplines produce specialists who find it difficult to communicate with each other, let alone with the lay public. Technical words have meanings within contexts and are not easily shifted across disciplines. Perspectives are often so far apart, assumptions so disparate and units of analysis so different that each specialist is genuinely a layman to the other's discipline.¹³

The difficulties mentioned by Easton are found in nearly all the natural sciences, to a lesser degree. We believe with Easton that, contrary to the

natural sciences, in the human sciences there still are not theoretical and methodological frameworks with universal acceptance and which all researchers would use.

For personal, institutional and structural reasons, team research seems to be permanently established and is constantly gaining ground on individual research; it is therefore essential to study all its aspects from a positive preconception. Team research must be enabled to produce optimal results, though this does not mean that individual research is to be ignored. Thus, it would be very useful on this point to conduct a small number of studies of well selected cases.¹⁴

Notes

1. Joseph Ben-David, "Scientific Productivity and Academic Organization in Nineteenth Century Medicine", American Sociological Review, vol. 25, (1960), pp. 828-843; Bernard Barber, Walter Hirsch, The Sociology of Science, op. cit., pp. 305-328. Also, Talcott Parsons, "Some Aspects of the Relation Between Science and Ethics", Social Science, vol. 22, (1947), pp. 213-217; A.B. Cherns, "Models for the Use of Research", Human Relations, vol. 25, no. 1, pp. 25-23; Donald C. Pelz, "Some Social Factors Related to Performance in a Research Organization", Administrative Science Quarterly, vol. 1, (1956), pp. 310-325; Charles V. Kidd, American University and Federal Research, (Cambridge, Mass.: The Belknap Press of Harvard University Press, 1959), pp. 206-231. Most of the studies deal with research in the natural sciences, but nothing leads us to believe that the situation is different in the human sciences.
2. A.H. Cottrell, "Scientists: Solo or Concerted", The Listener, (September 15, 1960), pp. 411-412; Bernard Barber, Walter Hirsch, ed., op. cit., p. 390. These comments are valid but as we have mentioned, only on condition that teaching does not provide such a feeling of security that professors are not motivated to do research.
3. This, at least, is the conclusion drawn by Karl W. Deutsch et al., "Conditions Favoring Major Advances in Social Sciences", Science, vol. 171, (February, 1971), pp. 450-459. From 1900 to 1929 the university already held a predominant position, compared to autonomous institutes and to the institutes affiliated with public or private enterprise; between 1930 and 1965 the university strengthened its position even more.
4. Report of the Laval University Task Force, pp. 60-66.
5. OECD, The Research System, vol. 3, Canada-United States. General Conclusions (Paris: 1974), pp. 102-103. Also, Daniel Alpert, "The Role and Structure of Interdisciplinary and Multidisciplinary Research Centres", Proceedings of the Ninth Annual Meeting of the Council of Graduate Schools in the United States (Washington, D.C.: 1969), pp. 75-81.
6. Almost without exception, the peak period for research institutes and centres is very short, 10 years at the most. It is usually followed by a period of stagnation, which in turn is followed by a much longer, if not interminable, period of decline. These centres exhibit a tendency toward bureaucracy and permanence that makes research sterile; on this subject, the Report of the University of Montreal Task Force proposes that the centres be replaced by work units set up for a specific task and then dismantled as soon as the work is done. However, this way of organizing research lacks some of the advantages of the productive research centres. Universities, like any organization, must abandon structures that have become obsolete. More extensive studies applying the theory of organization are needed in this area. See Wilson Record, "Some Reflections on Bureaucratic Trends in Sociological Research", American Sociological Review, vol. 25, (1960), pp. 411-414.

7. Wilson Record, *ibid.*
8. A.H. Cottrell, "Scientists: Solo or Concerted", The Listener (September 15, 1960), pp. 411-412; Bernard Barber, Walter Hirsch, ed., *op. cit.*, pp. 390-391.
9. Karl W. Deutsch et al., *op. cit.*, p. 456. The authors do not mention Canada. They feel that before 1965 this country made no major contributions in the social sciences.
10. Wilson Record, *ibid.*
11. Karl W. Deutsch et al., *op. cit.*
12. Herbert Jacob, "Some Consequences of the Development of Scientific Social Sciences", in Stephen D. Kertesz, ed., The Task of Universities in a Changing World, (Notre Dame University: Notre Dame Press, 1971), pp. 92-110.
13. David Easton, "The Social Sciences and Public Policy"; "The Royal Commission on Bilingualism and Biculturalism as a Reference Point", National Social Science Conference (1975), p. 6. See also A Commitment to Excellence, (Kingston: Queen's University, 1975), pp. 74-76.
14. These studies should include research using qualitative as well as quantitative methods, because, despite opinion to the contrary, team research makes it possible to use both methods.

V RESEARCH INFRASTRUCTURE

Only with a great deal of time, perseverance and sagacity acquired from one's own errors does it become possible to evaluate the full implication of a given method of organization or form of individual or team work for a certain institution and type of research. With more time and effort, it may be possible to formulate general propositions that can serve as models for all universities. However, a much better knowledge of the parameters of scientific research in the human and natural sciences will be required to achieve this; furthermore, the theories and methodologies of the human sciences will need to be refined.

All efforts to improve the organization of research and the functioning and efficiency of research teams may produce unsatisfactory results in the next few years. However, once the essential and nonessential components of these questions - and the energy devoted to the nonessential is far too great - are sorted out, and the emphasis placed on the diversity of research requirements, not the standardization of research structures and orientations, we will see that these efforts have paved the way for more suitable, stable institutional arrangements.

These discussions on fundamental issues will continue, and we can only hope that they will provide a better understanding of the situation created by the development of research as a specific activity of the university. There is another kind of problem of which we are fully aware and upon which we can act immediately, namely the means and resources, or the research infrastructure. Research comprises a set of procedures and techniques which make up the elements of a method requiring personnel and equipment.

Most of the reports of our task forces and disciplinary studies have examined at length the various aspects of the research infrastructure: facilities, computer centres, statistics centres and data banks, university presses, libraries, scientific communication systems, and so on.¹

Due to a lack of personal interest and careful thought, many university researchers have little to say about the general organization of research or work in teams; on the other hand, they could talk forever about the research infrastructure, but they have practical, often extensive, experience with a number of these questions.

Many points examined will appear commonplace. But experienced researchers will recognize that the most acute difficulties encountered during their research work are due much more to practical constraints than to theoretical or methodological problems. On the contrary, these material constraints have often been the cause of theoretical or methodological uncertainties, though the reverse may have sometimes occurred.

Unfortunately, all of the aspects covered are so complex that we can shed only some light on each. We consider it justified to proceed in this manner, since there is a general acceptance of these very well-known aspects.

1. Research and Building Facilities

The considerable capital funds granted between 1960 and 1970 enabled most Canadian universities, old and new, to erect spacious buildings to accommodate an unprecedented influx of students, a growing number of teachers, an increasingly diversified professional staff and administrators of all ranks and competence, whose numbers spiraled as a result of the unwieldiness of the administration.

With the expansionist wave over and the capital funds dried up, it is possible to evaluate the effects of the new material facilities. It is impossible, however, to draw conclusions, due to the absence of data for Canadian universities as a whole. Based on the comments gathered, the situation is excellent in some universities and satisfactory in others. There is noticeable grumbling, however, in some universities. Certain serious and often irreparable mistakes were made in the design of costly buildings. Vast areas are underoccupied, either because the space requirements were overestimated, as in the natural sciences, or because the plans were too grandiose; whereas elsewhere in the same institution people are jammed into inadequate quarters.

In many cases the human sciences pay the price for these errors in judgment. Facilities are tight at all levels: teaching, research and other activities. There seems to be a combination of factors to explain this regrettable situation: an unexpected rise in the number of students and changes in teaching methods (partial abandonment of didactic courses in favor of more flexible instruction in small groups) and establishment of sub-groups or "laboratories" under the direction of teaching assistants; in short, these are all reasons to justify more numerous and functional facilities. At the same time, departments

and educational units have increased and use more space for administration, teachers and students. New services have been developed and have expanded greatly, particularly audio-visual.

Buildings for the human sciences were generally built with undergraduate studies in mind. As recently as 1960, the exact requirements of graduate studies and research in this sector were unknown. But 1965 marked the beginning of a changing situation. Very often, the existing facilities meet neither the specific requirements of graduate studies nor those of research. It had been thought very simply that graduate teaching would follow the pattern of the undergraduate level and that research conditions would be the same as prior to 1960.

With the growth in the number of graduate students - growth that will continue at the master's level as a result of the extraordinary expansion and reorientation of research since 1965 - these judgment errors have sometimes had catastrophic consequences: no special facilities for master's and doctoral students, no seminar rooms for small groups, no "laboratory" rooms and no space for documentation, research and especially team research.

The most disadvantaged universities are striving to reduce the difficulties created by this situation. According to prevailing government standards, on the whole these universities have adequate facilities; moreover, there is expected to be a decline in the number of undergraduate students in the next few years. University administrators have no choice but to permanently put up with existing premises and conceive makeshift means of freeing congested space, and to develop in other buildings more suitable facilities for graduate studies and research in the human sciences. The possible solutions are expensive and often painful in human terms - for example, the breaking up of units, departments, schools and faculties that have long worked side by side and are joined together by a common solidarity and organic links, in order to relocate them in different settings.

Of course, those who would judge Canadian universities by comparing them with European universities would conclude that the former are very demanding. Such comparisons are quite unsatisfactory. Teachers at Canadian universities have different habits and requirements from their European counterparts, and the latter are quick to adopt these when they join the faculty of our

universities.

The lack of facilities for graduate studies and research is more or less critical according to the university. It will be 10 years or more before the University of Quebec at Montreal has adequate facilities designed for teaching and research. Conversely, a few years ago, York University began to develop, first with the initial nucleus of Glendon College, then according to the growth rate of its needs. In search of more land, Laval University decided at the end of the '50s to leave the Latin quarter in the heart of old Quebec; it designed and built a campus on one square mile of waste ground at Sainte-Foy. Notwithstanding its vast buildings, it has been suffering from a space shortage since 1970, and its facilities are poorly designed or badly utilized. On the other hand, McGill University continues to grow in the heart of Montreal as a very old and somewhat attractive property adjoining new buildings freshly conceived in the minds of architects.

Universities experiencing real problems with the organization of their facilities must urgently resolve them. They already pay a high price for internal harmony among students, teachers and administrators, and for quality teaching and research. The price will become inordinately high unless the situation is rectified quickly.

2. Data-processing Centres

In universities where graduate studies and research are somewhat developed, the available equipment includes consoles branched onto library services, calculators, microfilm readers, microfiche readers, light tables, projectors and other audio-visual equipment, photocopying and duplicating machines and recorders. But it is the increasingly widespread use of the computer that has contributed extensively to revolutionizing graduate studies and research in the human sciences as well as in the natural and health sciences.²

For example, the research of the Commission of Inquiry on Bilingualism and Biculturalism would have been much less extensive without the computer. Only the mobilization of all the authorities of teaching institutions and private and public bodies in Canada over a period of years could have offset the absence of the computer, and this does not take into account the uncertainty and the prohibitive costs of such a gigantic endeavor. The computer reduces calculation

time by millions of times; it enables the simultaneous consideration of a large number of variables; it enables the infinite multiplication of possibilities as well as their combinations. It speeds the process by thousands of times, makes content analysis incomparably more accurate and identifies textual errors and corrects them. Freed from these wearying tasks, the researcher is able to devote his time to the conception of theoretical frameworks, methodology and analysis. Moreover, data-processing paves the way for the solution of problems already known but not dealt with satisfactorily in view of their dimension or complexity, or for the solution of problems that no one had ventured to formulate, since they appeared beyond reach.

Data-processing has substantially increased the possibilities of quantitative research. We are much less aware of the precious help it can give to nonquantitative research. A competent researcher who uses the computer simulation process can augment the knowledge of structures and objectives of complex systems (social, economic, political, ecological, etc.) and test the quality of their functioning with reference to simulated social environments that are just as complex. Canadian researchers have cooperated in the development of highly promising simulation techniques.

Many teachers at Canadian universities are very naive and unaware of the computer's potential. The latter is certainly not a "thinking" machine, nor is it merely an improved calculator. It does not replace the human brain but increases its potential ten-fold or one hundred-fold.

Conscious of the issues raised by the increasing utilization of the computer in research in the human sciences, the Canada Council established a task force on survey research. The terms of reference of that group were to determine the current situation and make recommendations aimed at solving the problems identified.³

Some of the task force's findings are astounding. With few exceptions, universities do not provide sound courses in quantitative methodology at the undergraduate level, even less at the graduate level; this deficiency is due to the very small number of teachers who have received training in methodology. The only two university bodies specialized in survey research are the Institute for Behavioral Research of York University and the Centre de sondages of the University of Montreal. These bodies, particularly the one from Montreal, have

a great deal of difficulty in remaining afloat financially, and their field of operation is restricted. Members of the task force have ascertained that many researchers using one of the numerous forms of survey research do not appear competent to design and conduct the research as well as analyze its results; moreover, they are not always as prudent as they should be toward the respondents or the utilization of results. Finally, the group deplored the total lack of coordination of efforts, which led to unnecessary repetition of the same surveys and the lack of uniformity in the statistical categories and independent variables used. It is therefore impossible to make comparisons in time and space among surveys conducted on the same topics, and there are still no "data banks" in Canada in which research and practitioners could "invest" or from which they could "borrow".

The task force submitted to governments and research granting bodies a number of recommendations that we consider useful to reproduce.

It is in the interests of governments, as clients for the results of surveys, to provide directly, or through their organizations, investment for supporting research that will enhance the theoretical and methodological capabilities of university survey centres.

Given the learning and experience required for leadership in survey research, a scheme of internships should be worked out with university survey centres, the awards to be offered to a few appropriate candidates.

A peculiarly Canadian problem is the development or adaptation of measuring instruments in survey research that are suited to Canada's varied cultures; applications for support in work of this kind should be assessed on their merits as such.

The productivity of survey research can be greatly enhanced by well-run major data banks; because these will be useful far beyond the institutions that house them, they should be regarded as regional or national research resources and their development and operating costs should be funded accordingly.

The arrangements for deposit of data and the date when they will be released to others should be stated in the grant application and may become conditions of acceptance of the grant.

Costs of preparing data for useful storage should be indicated in the grant application, although the disbursement of funds for this purpose may occur later as a supplementary grant.

Investigators should strive for standardization in collection and coding of data to permit inter-survey comparisons, so far as is compatible with the essential purpose and design of the research; if standardization imposes extra cost, it should be an eligible component of the budget on which the research grant is based.

Principal investigators will often need release from other duties at the beginning and end of major survey projects; stipends for this release should be allowable in research grants and payable as accounted for.

Grant applications should include minimum stipulation for the protection

of survey respondents.

Investigators should take care to avoid saturation of those populations that are frequently subjects of surveys.⁴

This list of recommendations, which we support, reaffirms more systematically the observations of many of our task forces, particularly those of British Columbia and York.

3. Specialized Journals

Less so than their colleagues in the natural and health sciences, yet increasingly so, social scientists and humanists publish some of the results of their research as research notes and articles in specialized journals. In Canada, there is a large number of journals to meet most requirements. The reports of our disciplinary studies emphasize the importance of these journals as the main *raison d'être* of scholarly societies: without them, these societies would be like bodies without a soul.

Like many other cultural activities and vehicles, Canadian scientific journals must take into account the two official languages and two principal cultures. The great majority of "pan-Canadian" journals are officially bilingual, and many have taken action to ensure the publication of articles and recensions in French: appointment of two editors and two staffs responsible for recensions (one Anglophone, one Francophone), boards of directors and editorial committees comprised of Francophones and Anglophones. La Revue canadienne de science politique/The Canadian Journal of Political Science has developed the most original structure. It is the official organ of two autonomous scientific associations, the Société canadienne de science politique and the Canadian Political Science Association. The two editors of the journal are named by their respective associations, each having to be confirmed by the other association. The editors periodically report their activities to the two boards of directors and at the annual meeting of the members of each association. Each editor is responsible for the journal as a whole but, in actual practice, the francophone editor attends to the French content and the anglophone editor to the English. An examination of scientific journals from this angle would undoubtedly reveal that such an organization produces widely varying results from one journal to another. Some journals are able to publish regularly one or two articles and a certain number of recensions in French; others are not.

Case studies would help to better understand the reasons behind these successes and failures.

In addition to the journals of Canadian associations, there are a large number of high-quality journals focusing on the national or regional scene. Journals such as Queen's Quarterly, The Canadian Historical Review, Journal of Canadian Public Policy/Analyse de politiques, The Journal of Canadian Studies/Revue d'études canadiennes are among the best known English publications with university ties. Scientific journals in French are proportionately greater in number: La revue des relations industrielles, La revue du service social, Recherches sociographiques, Etudes internationales, Etudes littéraires, Les Cahiers de Droit, Cahiers de géographie du Québec, published by the Presses de l'université Laval and Sociétés et sociologies published by the Presses de l'université de Montréal are among those that have deservedly attracted international attention. With the exception of The Canadian Forum, anglophone academics have few periodicals to popularize their ideas. Their francophone colleagues have a wide choice of periodicals of most diverse ideology, and they can easily publish in newspapers, dailies and weeklies. Le Devoir, in particular, has always welcomed their contributions, and this continues to persist today despite ideological differences between the official federalist and capitalist line of thinking of this newspaper and the separatist and socialist orientation of many teachers.

Academics are generally careful not to criticize their journals severely, since the latter's quality or mediocrity is the result of their own manuscripts. Based on the reactions of members at the annual general meetings of associations and on the statements made by the journal editors on comments they have received, Canadian scientific journals in the human sciences maintain a high standard.

The following criticisms are heard the most frequently: pursuit of an impossible freedom from ideology, adherence to rigid and even aseptic "scientific" conformity, absence of "polemic," favoritism toward senior faculty, slow publication procedure and, especially, irrelevance. Here, for example, is what Raymond Breton, editor of Revue canadienne de sociologie et d'anthropologie, has written:

Critics as a whole state that the content of the Revue does not reflect the most important and topical issues; that it does not deal with current problems; that it does not help in understanding the forces that shape our institutions;

and that it does not take into consideration the differences in the cultural make-up and social structure of the various regions...that for a society undergoing rapid change, there is very little in the way of studies assessing changes in social institutions, systems of power relations and demographic trends; that for a society which, in many respects, has a distinctive history and forms an aggregate of economic, cultural and demographic conditions, there is very little (in the Revue) that is distinctly Canadian. And so forth.... Of course, all critics are not as severe and their points of view vary extensively. Some consider that these criticisms apply particularly to the Revue, while others think that the Revue accurately reflects the existing situation in sociology and anthropology.⁵

Hasn't every editor of a Canadian scientific journal expressed similar views at one point or another? We believe these are healthy views because they are moderate and the result of constant self-appraisal, which is first conducted by the boards of directors and is further assessed through the interventions of the members of scholarly societies at annual meetings. For their part, editors of scientific journals frequently deplore the lack of good manuscripts, and they solicit articles and contributions that touch on more pertinent subjects and more controversial issues. There is room for improvement, and this is acknowledged by Raymond Breton, but these journals greatly deserve the financial aid that many already receive from the Canada Council.

4. University Presses

Due to a firmly established tradition and the requirements of their discipline, social scientists and humanists publish their work in book form - a practice much less widespread among their colleagues in the natural sciences.

French- and English-speaking university teachers may utilize any Canadian commercial publishing firm to publish their work. However, only university presses regularly assume financial risks by printing highly specialized, non-profitable publications. Francophones have three university presses available - Laval, Montreal and the University of Quebec at Montreal (UQAM) - and Anglophones have nine. Among the latter, the University of Toronto Press is the largest; it prints nearly three-quarters of all English-language Canadian university press publications, and its annual publications list is more than double that of the other eight anglophone university publishers. Conversely, the three French-language publishers are approximately the same size, with the oldest, the Presses de l'université Laval, having lost most of its initial lead. Furthermore, the University of Toronto Press has the advantage of publishing

most of the journals of Canadian scholarly societies. Its size is also measured by the number of books published in a year; in 1973, it followed closely behind the University of California Press and preceded such well-known university presses as Chicago, Harvard, Princeton and Yale.

The report of our University of Toronto task force indicates an increasingly precarious financial situation over the last few years at the University of Toronto Press. Even with the profits realized by the bookstore, the operations have been so far in the red that the general operating funds of the university cannot continue to cover the deficit as they have until now. Unless there is outside funding, publishing activities will have to be curtailed, and this is already occurring. The situation is no better elsewhere.

Authors who have had work published by university presses have many complaints: too long a time required for publication; unnecessarily expensive publications whose costs are too high and a market that is too small. For these reasons, authors have made it a habit to publish through the university presses only their most specialized books, and they have resorted to commercial firms for their popular works or for subjects likely to interest a wide readership; this does not help the situation of the university presses. The latter should abandon certain routine production and distribution processes which, on both the French and English side, may be too extensive for current requirements. Other mergers like that of McGill and Queen's University could prove profitable. At the very least, this could enable the pooling of certain technical and marketing services.

However, the fact that so many teachers have published is due to university presses. With more financial security than commercial firms, these presses have taken risks that the latter would not have wanted to run. Their basic publication criterion is the intrinsic value of the book, not its commercial value as is usually the case with business firms, except for their so-called "prestige" publications.

For this single reason, university presses, an indispensable extension of graduate studies and research, must receive special financial aid not only from the universities who established them and to which they bring prestige, but increasingly from research granting bodies.

Two issues related to the publications of university teachers deserve

special attention.

The first concerns the largest and fastest possible distribution of research results in the human sciences. Scientific journals and university presses obviously cannot publish all the works of researchers. This results in a great deal of bitterness among authors whose articles are not accepted or whose work, though excellent from a scientific point of view, does not have the "finish" required by scientific journals and university presses. Above all, valuable contributions, which would advance knowledge if they were known, are lost to science.

To correct this situation, the Social Science Federation of Canada and the Canadian Federation for the Humanities are attempting, in cooperation with scholarly societies, to establish a scholars' press that would publish as quickly as possible the manuscripts it received. The only judges of the value of the publications would be the readers. The advantages of such an enterprise are quite evident: considerable reduction in costs and time required for publication as well as accessibility to all. Two serious disadvantages are equally evident: excessive increase in the number of publications, when everyone already deplores his inability to read even the basic works in his discipline; and inducement to *laissez-faire*, since many authors will cease to see the need to "polish" their documents.

The debate is launched. In a period of microfiches and other techniques of rapid and economic distribution, the creation of such a scientific publishing institution would contribute to the excessive inflation of an already saturated market of scientific publications.

The second issue relates to the translation of published works. In an officially bilingual country like Canada, the only concrete form of potentially successful bilingualism is institutional in character, not individual; one must expect that good English publications will be quickly translated into French and vice versa. While many Canadian teachers and students read both languages, it is quite normal and easier for them to read mainly in their first language. In addition, Francophones must often read English in view of the preponderance of English references; the absence of French versions of good English works imposes a penalty on them. Furthermore, authors do not write only for academics, and there is less knowledge of the second language outside the university.

Finally, the target readership reaches beyond Canada. The unique importance of English and French at the international level is another argument to justify the translation of good publications produced in Canadian universities.

For several years, the Social Science Federation of Canada and the Canadian Federation for the Humanities have administered funds from the Canada Council earmarked for the translation of Canadian publications. This successful endeavor must be continued and even extended. The time has come, however, for an in-depth assessment to determine its strengths and weaknesses and to make the necessary adjustments as soon as possible. Thus, the period of time separating publication in the original language and the translated work could be reduced if, for works of real merit, the funds earmarked for translation were granted upon acceptance of the original manuscript, instead of awaiting publication as is now the case. In addition, the councils have new committees responsible for assessing the value of the work already published in the original language and its translation. Thus, there are additional delays.

A second point among many others requiring improvement is the need to make available teams of professional translators with a knowledge of the technical vocabulary of the principal disciplines. Translation from French to English is presently so poor that publishers have not printed some of the already translated publications; or because of the difficulty in finding good translators, they have reluctantly abandoned their plan to publish. While Belgium, England and Scandinavia have excellent translators from French to English, their services cannot be retained, since the prevailing regulation requires translators to be Canadian citizens or landed immigrants to receive payment from the Canada Council.

5. University Libraries

One commonly hears that university libraries are to the human sciences what experimental laboratories are to the natural and health sciences. But this statement is equivocal. In these latter disciplines, books, periodicals and documents are necessary and not just minor working tools of laboratories. In the human sciences, however, the library is often even more essential, since there are no laboratories and it is thus the principal working tool, if not the only one. It is also important to distinguish adequately between the number

and cost of the elements of disciplines of a given sector. Thus, at the University of Toronto, the price of a book in the natural and health sciences is estimated on the average to be two and a half times that of a book in the human sciences. Of the 25,819 journals to which the library of this university subscribes, 16,802 (65%) relate to the human sciences and 9,017 (35%) to the natural and health sciences. But the latter are more expensive (\$316,000 as opposed to \$235,000), since each journal is on the average two and a half times more costly than in the human sciences.⁶

An assessment of the situation of university libraries is necessary in view of the special emphasis on written work in the human sciences.

In their report on the development of graduate studies in the universities of Ontario, John Spinks and Kenneth Hare stated the following:

The library is the heart of the university. From it, the lifeblood of scholarship flows to all parts of the university; to it the resources of scholarship flow to enrich the academic body. With a mediocre library, even a distinguished faculty cannot attain its highest potential; with a distinguished library, even a less than brilliant faculty may fulfil its mission. For the scientist, the library provides an indispensable backstop to his laboratory and field work. For the humanist, the library is not only his reference centre; it is indeed his laboratory and the field of his explorations. What he studies, researches and writes is the product of his reading in the library. For these reasons, the university library must be one of the primary concerns of those responsible for the development and welfare of the institution. At the same time, the enormous cost of acquisitions, the growing scarcity of older books, the problems of storage and cataloguing make the library one of the most painful headaches of the university administrator.⁷

Without a library well-stocked in at least some disciplines, and irrespective of the quality of faculty and students, the organization of research, etc., it would be impossible to establish good graduate programs and to complete research projects that are not confined to the use of field work methods.

Up to the early '60s, when Canadian libraries began to grow considerably, there was hardly a single research library deserving of this title in Canada, except perhaps those of the University of Toronto and McGill University.

At the turn of the '40s, Harvard University alone had nearly as many books as Canadian university libraries as a whole (4,159,606 compared to 4,389,380). And in 1958, the situation had barely improved: Harvard had 6,350,227 books compared to a total of 8,773,799 for Canadian university libraries as a whole, and they spent more that year than the eight Canadian universities experiencing

the fastest growth in this sector; Harvard, of course, added more publications to its holdings than these eight universities combined.⁸ Moreover, the publications and collections gathered at Harvard under a unique program were superior in quality to the heterogeneous and repetitive gatherings of Canadian universities acting separately.

In their 1947 report on the humanities in Canada, Watson Kirkconnell and A.S.P. Woodhouse stated the following:

All in all, the general picture of university and college libraries in Canada is not a happy one... The Canadian researcher in the humanities will continue, so far as Canadian resources are concerned, to flounder in an undrained swamp.⁹

In his major inquiry on the situation of Canadian university libraries at the start of the growth years of the '60s, Edwin E. Williams made the following observation:

It will be expensive to build all the foundations that ought to be built. Canadian universities, for the most part, are only beginning to face the cost of providing library resources genuinely adequate for advanced work in the humanities.¹⁰

In 1966, John Spinks and Kenneth Hare noted in their report that in Ontario, the province with the most university libraries, only five out of 14 libraries had adequate collections for undergraduate requirements; moreover, none of the 10 universities with master's and doctoral programs had the necessary holdings to meet the requirements of these programs.

Here is what Bora Laskin wrote in his 1965 report on graduate studies at the University of Toronto:

...the kind of library and library system we need in order to rank with universities elsewhere which offer excellent graduate work will be very expensive... We are anxious that the immensity, the importance, and the costliness of this necessary library expansion and maintenance should be grasped by all those concerned. It is certainly among the most crucial of the enterprises on which the future of the University of Toronto will depend.¹¹

Many universities, including the University of Toronto, agreed throughout the '60s to allocate to libraries an increasing proportion of their operating budget. The only financial aid granted to universities was from the Canada Council, and it was minor for each university. Over a period of 10 years, from 1958-59 to 1967-68, the Canada Council granted to universities and colleges \$68,000,000 in capital funds, with a certain percentage undoubtedly for building and making improvements to university libraries. Furthermore, over a period of

12 years, from 1961-62 to 1972-73, the Canada Council awarded \$3,361,000 to eligible universities to improve their collections. These programs have been abandoned and we do not recommend that they be started again, at least not in their original form.

The efforts of the '60s have been productive for many universities. The University of Toronto library, with 3,556,497 books in 1970-71, is now international in size and is ranked ninth among North American university libraries behind Harvard (8,451,187 books), Yale, Illinois, Michigan, Columbia, California, Cornell and Stanford. Following well behind are the University of Montreal library (1,420,106 books) and those of British Columbia, McGill, Alberta, Western Ontario, Manitoba and Laval. Queen's, Ottawa, Saskatchewan, York, McMaster, Dalhousie, Windsor and Carleton¹² form a third grouping of universities, each with holdings of 160,000 to 500,000 books.

The advances made at the University of Toronto during the 1960s were spectacular. Considerably enriched, its library is now excellent for research in various sectors of the human sciences. Despite their efforts, the other universities are lagging far behind. They certainly have adequate collections for graduate students and some specialized researchers, but more is required to be a great library.

Our observations are confirmed by those of Watson and Stuart-Stubbs:

The majority of Canadian university libraries have not yet attained the depth and breadth in their collections which are necessary for graduate study in the humanities and social sciences, despite the rapid growth which took place in the '60s.

These two authors add, "given present circumstances, they may never attain essential maturity, let alone richness."

In the '70s, there has been a slowdown in the growth of university libraries; and in the last four years, there has even been a falling behind. University libraries that were beginning to develop adequate holdings are now losing ground. Universities have increased needs in all areas, yet they have relatively fewer funds from year to year as a result of inflation. They are forced, therefore, to cut certain services, starting with libraries. On a strictly administrative basis, it is easy to diminish the absolute value of expenditures on books, periodicals and documents, whereas it is virtually impossible to do so with maintenance costs and salaries. The figures speak for themselves. Data

from the Association of University and College Libraries for 1967-68 indicate that, of a total expenditure of \$48,229,305 for Canadian university libraries, \$33,865,741 or 70.2 per cent went to salaries and other expenditures, and \$14,363,564 (29.8%) to the acquisition and binding of books. The proportions changed very little in 1973-74. Of a total expenditure of \$73,165,402, \$50,478,290 (68.9%) was for salaries and other expenditures and \$22,787,112 (31.9%) for acquisitions and binding. To offset rising costs, which are much higher for books than in most other areas, at least 40 per cent more funds would have had to be allocated to acquisitions and binding just to maintain in 1973-74 the purchasing power of 1967-68.

Watson and Stuart-Stubbs discuss the inhibitory effects of this development: At some libraries, collections budgets were cut, at others there were modest increases. But nowhere were increases sufficient to offset the inflation in the costs of library materials, which has been exceeding 10% annually, and the rate of accessions declined generally... At the University of Toronto, 1968-69 was the last year in which the rate of growth climbed. The Chief Librarian at the University of Alberta reported that 1973-74 saw a decline of 15.5 per cent in the accession rate, the fourth successive year of decline. The University of British Columbia Library's level of acquisitions has dropped steadily from 164,000 net volumes in 1970-71 to 95,000 in 1973-74. These conditions are typical for all of Canada. Most librarians do not believe that the years ahead hold great promise for a relaxation of increasing austerity.

The University of Toronto library has two and a half times as many books as the University of Montreal, which is ranked second; in 1975, it moved to the spacious, functional facilities of the Robarts Building. One would believe that this university is in a satisfactory position.

On the contrary, the University of Toronto task force considers the future of the only major university library in Canada rather gloomy:

The trend in book acquisitions budgets is cause for genuine alarm. A library has costs which recur year after year for currently published books, journals, and bindings; these costs are called non-discretionary. Five years ago, the University of Toronto library spent about 40 per cent of its acquisition budget on such costs. The other category of costs is out-of-print books and serials, new subscriptions, and extra copies for departmental libraries and other locations; these costs are called discretionary. Five years ago, the library spent 60 per cent of its budget on such costs. Since then the proportions have reversed; in the 1973-74 year, 60 per cent of the budget went to meet non-discretionary costs and the balance of 40 per cent to meet discretionary costs. The causes are the rapid increase in the costs of books and journals impinging on a book-acquisition budget that has been held, in effect, level. If these conditions continue, by 1980 all the book-acquisition budget will be needed for

non-discretionary buying. Thereafter even these costs cannot be met; at that point the largest research library of Canada will be unable even to keep up with current publication.¹³

This distress signal of the University of Toronto is undoubtedly having repercussions in all Canadian universities.

There is another question that directly concerns the University of Toronto - the interlibrary loan service. This requires a Union catalogue, which is being constituted under the auspices of the National Library.¹⁴ Even if still incomplete, the Union catalogue already provides 80 per cent of the 125,000 book loan requests made annually. The University of Toronto library contributes so extensively to the operation of this service that its budget could become unbalanced. Between 1969-70 and 1973-74, the number of books loaned to other libraries rose from 25,290 to 31,490 while books borrowed by this library remained stable at about 4,000 annually. Also, depending on the years, from 33 to 50 per cent of the books borrowed were received from foreign libraries. Out of 100 exchanges in Canada, 84 are books loaned by the University of Toronto and only 16 are books borrowed by this same university. According to the Toronto task force, the library invested \$269,227 in 1972-73 in the interlibrary loan service. It cost the library \$77,137.50 to borrow 4,125 books (at \$18.70 per book) and \$192,089 to loan 31,490 books (at \$6.10 per book). There is a difference of \$114,951.50 in the expenditures of book loans to and from the library. If only Canadian operations for 1973-74 are considered, the University of Toronto library invested \$229,252.90 in the interlibrary loan service, \$183,307 to loan 30,546 books and \$45,945.90 to borrow 2,457 books, resulting in a loss of \$137,371.10. On the other hand, the University of Toronto comes out ahead in its exchanges with American libraries.

According to the task force, the library of this same university plans to seek reimbursement of the deficit it sustains as a result of its substantial involvement in the interlibrary loan service. This practice has been gradually established in the United States over the last few years. Moreover, borrowing libraries must sometimes reduce certain other important expenditures to meet the extensive costs of this service (an average of \$18.70 per book).

It will be difficult to reverse the trend of decreasing library budgets which has been developing over the last five or six years and which is beginning to affect university libraries. Corrective measures are urgently required.

We believe, however, that the financial responsibility, both for acquisitions and interlibrary loans, is not solely or even primarily a federal responsibility. Each university library is first and foremost intended to serve the students and faculty of that university. Each university is therefore the best judge of what books and periodicals should be acquired for this purpose, and each university should allocate an appropriate amount from its total budget to meet these library requirements.¹⁵ There are some library acquisitions which serve a wider clientele because they may be borrowed by students or faculty at other universities or used by them on visits to the library. To the extent that this takes place within a province, the university library is playing a provincial as well as a university role, and it would be logical for the provincial government to fund this activity or to reimburse the university in some way.

The library holdings of a major university library, however, may also serve students and faculty from universities situated in another province. The University of Toronto library, for example, has holdings which no other library in Canada can duplicate. But neither the university nor the province of Ontario should be expected to increase their library expenditures for the possible benefit of out-of-province clients. From a national perspective, however, major universities should be encouraged to acquire holdings which go beyond the immediate requirements of the university or province. It is here that the federal government has a role to play. What is needed is a form of federal aid for library acquisitions or library services which might not seem justified from a university or provincial perspective.

How should this federal support be allocated? One possibility would be to identify the major university libraries in Canada and to award federal funds to them. The list, based on size of library holdings, would begin with the University of Toronto, followed by Montreal, British Columbia, McGill, Alberta, Western Ontario, Manitoba and Laval. But a program which restricted federal aid to these libraries would be open to some serious objections. Developing universities would have little chance of catching up and being included on the privileged list. Nor is there any allowance for the smaller university libraries which may nevertheless have collections in certain fields that are unique in Canada. A more serious limitation of such a program is that it makes no allowance

for provincial or regional inequalities. Saskatchewan and the four Atlantic provinces, for example, would be excluded if the federal grants were restricted to the eight major university libraries. If the list were extended, however, to include support for special collections and to distribute federal aid to all provinces, the federal program would be ineffective. The funds would be dispersed so widely that the actual grant to any one university library would be too small to have any impact.

Another serious objection to a federal program of direct grants to selected university libraries is that such grants would not necessarily contribute to the federal objective. The primary role of these libraries, as we have seen, is to serve the students and faculty at that university. At each university, the decisions on what books and journals to acquire would reflect this responsibility, and in many instances the same books and periodicals would be bought. There would be no guarantee that the federal grant would add significantly to the range of library holdings in Canada. It is also likely that over a period of years any such federal grant would be taken for granted and thought of as part of the normal library budget. Universities might tend to allocate less money to the library because of these federal funds. Any special impact that the federal program might have had on library acquisitions would diminish or disappear.

We do not conclude from this that the federal government should not contribute to the cost of university library acquisitions or services. The objective, however, must be a federal program which would allocate funds as directly as possible to the support of acquisitions and services that would not otherwise be provided. In a subsequent chapter we present our proposals. In brief, we shall recommend a federal grant to reimburse universities for at least part of the cost of the purchase of books and journals that are not held by other universities in Canada, and a federal grant to reimburse universities for the cost of lending books to out-of-province scholars on interlibrary loan.

We would like to be able to propose a global aid program for all university libraries. The provinces and regions, for their part, should seek to reduce the financial burden that libraries place on the operating funds of universities.

Master's and doctoral students, and especially research faculty, must have good libraries that are easily accessible. So much the better if their own university provides them, but they must fairly often consult other libraries in

their city (especially Toronto and Montreal, which are very well supplied) or region (for example, Dalhousie in the Atlantic region). A Laval teacher may turn for help to the McGill, Montreal or Toronto libraries, or even the Widener Library of Harvard University, which is only one hour's flying time from Quebec.

Once the system of university research libraries is organized, mere consolidation will not be sufficient. All students and researchers will require the easiest possible access to these libraries; the library aid program will have to be extended by making funds available to individuals so that they can go to the nearest point in the research library system without having to face higher expenses than their more privileged colleagues. This measure will not be sufficient to provide full and equal opportunities among students and faculty. The library is not the only factor in the mobility pattern slowly developing in Canada and already existing in Great Britain, France and the United States: the best teachers and students tend to seek out the best-equipped universities. This mobility pattern favors the latter universities and creates a seemingly irreversible process of improvement of the best universities.

There is a particular problem concerning the University of Toronto library. The costs incurred by this library as a result of its contribution to the Canadian interlibrary loan service should be reimbursed by the federal government through funds made available to the Canada Council. This university should not be unfairly penalized as a result of its being by far the largest university library in Canada. Moreover, the federal government should cover its deficit, since the service it provides extends to the whole country.

6. Scientific Communication Systems

Graduate students and research faculty must have the required qualifications and work in a favorable setting with abundant resources, including a good library nearby. For their research to be fully successful, they must also be integrated into numerous and extensive communication systems. In many sectors of the human sciences, a researcher may succeed while working alone instead of in a team. But in most cases, working alone means ignoring ongoing research even in one's own discipline and dooming oneself to failure in advance.

In a study on scientific communication, Herbert Menzel puts forward three preliminary questions to those who wonder about the quality of a scientific

communication system:

What are the functions of the scientific communication system? What mechanisms are now available for performing them? What are the inadequacies in the present performance of each function?

He suggests that these questions be examined in the light of the three following objectives:

- 1) To distinguish the types of international needs which scientists have, and to determine in what respects they remain unsatisfied.
- 2) To examine the means and occasions of scientific information exchange, in order to single out the features which make them more or less able to meet the scientist's several needs.
- 3) To analyze characteristics of the scientist's specialty, his institution, and his outlook as possible conditions which influence his needs for information gathering habits and felt satisfactions.¹⁶

A study conducted in the United States compares the communication systems in the natural and social sciences and examines how teachers utilize these systems. The authors, W.D. Garvey, Nan Lin and Carnot E. Nelson, show that the informal and formal communication system is better articulated in the natural sciences than in the social sciences; they also note that social science specialists are much less aware of this system and therefore use it much less effectively. In addition, information does not flow as well and as quickly in the second system as in the first. Due to lack of input, there is less distribution of information prior to publication; the gaps in the formal and informal communication mechanisms reduce the quality and quantity of the information conveyed; flaws in the feedback loop permit fewer corrections to the manuscripts before they are transmitted to the publishers; finally, the deficiencies in the output or publications result in less extensive knowledge about works of reference, either because of a delay in publication, difficulty in finding publications or poor access to unpublished manuscripts.¹⁷ In short, though the structure of both systems comprises the same elements (theses, conferences, scholarly societies, manuscripts, technical reports for restricted distribution, journals, publishing firms, etc.) and the interactions of these various elements are similar in both cases, the output of the natural science system is greater than that of the social sciences. The authors seem to attribute the major disparities observed mainly to the attitudinal differences of the two groups of scientists toward their respective communication systems. The natural science specialists make optimum use of the latter and are constantly improving it;

social scientists do not use theirs as well, thereby preventing its proper functioning and improvement with use.

No real study is available to deal fully with this question of scientific communication in the human sciences in Canada and to establish comparisons with the natural sciences. We raise the question because of its importance and in the hope of creating more interest about it in the future. Though we cannot adhere strictly to Menzel's methodology and are even less able to produce similar results to those of Garney et al., we will raise various issues that would warrant further study. We will also formulate questions likely to make Canadian researchers more distinctly aware that they would benefit from a greater interest in their own scientific communication system.

These systems should perform the following major functions in the human sciences: enable specialists of a given sector to have easier access at less cost to recent research developments; facilitate meetings for the fruitful exchange of information; provide access for all to technical resources in order to help research work progress satisfactorily.

It is virtually impossible for the individual researcher to keep abreast of recent developments in his discipline, let alone closely related disciplines. If he depends exclusively on current publications (books and journal articles), he runs the great risk of being several months behind in his awareness of new knowledge even before undertaking his research. In the human sciences, where the time required for publication is longer, the time lag may be from a few months to several years.

Contrary to current opinion, it is not only in the natural sciences - though more visible there - but also in the human sciences that a lone researcher will unknowingly undertake work that has already been done and often published, but of which he is unaware!

By actively participating in a good scientific communication system, the chances of being the second or third researcher making the same "discovery" are considerably diminished. Notwithstanding the best bibliographical tools, it is impossible nowadays to be aware of all the most recent publications, even in one's specialty, since there are so many from all sources and countries and in different languages. However, integration into a scientific system will keep the researcher regularly informed about publications and in constant contact

with other specialists with whom he can discuss ongoing research.

In addition, it is very important for a researcher to meet the authors of publications that deal with questions he is studying. He often learns more in these informal encounters with an author than by merely reading his work. A difficult or vague point will be clarified; aspects the author decided not to raise in his publication but which are very important to the researcher working on the same subject will be discussed; information will be shared on developments arising since the last publications appeared. These exchanges of information between experts must be reciprocal to be really profitable. Thus, in the case of a beginning researcher, if the exchanges are one way only, the better informed specialist will soon lose interest in this kind of contact and provide very little information to his interlocutor.¹⁸

It is not enough for a researcher to "follow" scientific developments; he must "stay ahead" of them. To be informed of "science tomorrow," he must become acquainted with manuscripts which have not been published or whose distribution is very limited, especially manuscripts still in the hands of authors and publishers and awaiting future publication. It is only through active participation in a communication system that researchers can become acquainted with a considerable number of these manuscripts to be published later or not at all.

There are two other conditions for successful research work which can be realized through active participation in scientific communication systems: it becomes possible, on the one hand, for the researcher to identify the often distant and rare experts capable of advising him at any stage of his project, from the research design to completion of the work; and on the other hand, he is also able to locate scarce technical resources (complex equipment, documents, etc.) which he requires. As a result of regular information provided through the system, free exchanges among specialists, special conferences, etc., the researcher can identify and actually meet these experts; he also locates the scarce technical resources and can more easily receive permission to use them.

The second question concerns the nature and quality of the communication systems accessible to Canadian university researchers in the human sciences.

These systems are found at many levels: researchers working more or less closely together within the same university, Canadian scholarly societies and research institutes, international scholarly societies and foreign research

institutes. Research faculty at the University of Toronto are more likely to have colleagues in the same sector or closely related sectors than those at Mount Allison or the University of Quebec at Chicoutimi. Their chances of being better integrated into the regional, national and international communication systems are also greater. Research faculty who are privileged at the first level will more easily integrate into the other levels. Of course, even the smallest and most isolated universities have very active and influential professors in the national and international systems. But their integration requires extensive effort, which could ultimately have a negative effect on their scientific output.

Furthermore, every regional, national or international communication system has particular characteristics that may favor certain categories of researchers and be detrimental to others. These characteristics may be racial, religious, linguistic, and so on.

National communication systems in Canada naturally favor Anglophones and create linguistic and cultural difficulties for Francophones. Francophone research faculty must usually make greater efforts than their anglophone colleagues to reap similar benefits from participation in a Canadian system, and it is doubtful with all other factors being equal, that many achieve these benefits.

The authorities responsible for the Canadian scientific communication systems have attempted and continue to attempt to solve this difficulty, which can be traced to Canadian society itself. Certain operating adjustments that will be discussed in the section on francophone universities seem to restore the conditions of linguistic balance between the two groups of professors. Whatever the value of these adjustments, francophone professors tend to join together for cultural or other reasons, thereby creating an additional communication system that greatly facilitates their access to the international francophone system. Their colleagues from anglophone universities can enter this system if they understand French. We are aware of the importance for francophone professors of the Association canadienne française pour l'avancement des sciences (ACFAS): they are regrouped into a large number of disciplinary associations.

Specialized research institutes such as the Institute for Behavioral Research of York University and the Centre de sondages of the University of

Montreal are not yet sufficiently developed to meet all the ordinary needs of researchers. The latter must of necessity seek admission on a personal basis to foreign research centres, especially those in the United States.

It is at the level of their respective scholarly societies that Canadian research faculty are most privileged. Since the creation of the Royal Society of Canada in 1882, dozens of societies have been established with the development of advanced studies, first in the natural and health sciences, then in the human sciences. We asked the administration of eight of these societies in the human sciences to conduct a study on the state of their respective discipline. Most of these studies deal more or less with the society itself. The findings indicate that Canadian scholarly societies fulfil numerous important functions: increasingly forceful protection of their members' professional interests; intervention in public debate on the profession, such as scientific research or the protection of the members' individual rights; the annual conferences of presidents are tending to become real "ethical" reports on the state of the discipline or profession. Meetings of scholarly societies held each year in early June at a Canadian university provide a meeting opportunity for specialists of the same or closely related disciplines. Conferences are many and varied: members exchange manuscripts and discuss their respective research. Most associations publish a scientific journal that acts as a barometer of the state of progress of a given discipline. A good number of associations are members of international associations of the same discipline.

There are no data available on the members' satisfaction with their association nor on the various age, geographical, ideological or linguistic categories. Based on the participation level at annual meetings and the nature of discussions at general meetings, we have the impression that members are, on the whole, satisfied with their association. Thus, in many associations, the membership percentage is so great that the Canadian association constitutes, within the international association to which it is affiliated, the largest national association after that of the United States. This is the case, among others, of the Canadian Political Science Association. There is room for improvement in all these associations, and over the years there has been an effort to correct deficiencies and improve services.

The associations themselves are regrouped within three bodies: the National

Research Council, the Social Science Federation of Canada and the Canadian Federation for the Humanities. The latter two, which have been much better administered and more active in the last few years, deserve the confidence of their associations. They strive to provide a certain number of services: selection of manuscripts whose publication or translation is worth being grant-aided, and bringing pressures to bear on the federal government to protect and promote the interests of member associations and of various disciplines. They have, moreover, taken an active part in discussions of the reorganization of research granting bodies.

Except for research institutes and specialized journals examined earlier,¹⁹ the communication systems of the human sciences appear, on the whole, adequately developed to meet the needs of researchers. But their access to all graduate students and research faculty must be facilitated.

Two types of questions arise concerning individual researchers. First, scholarly societies and research councils to which they relate must provide them with information on their available services; indeed, no one must be deprived because of unawareness of the advantages that everyone can usually derive from these services. We refer here to students, beginning researchers and those who work in small universities far away from the central points of the communication systems.

The programs promoting participation of individual researchers in communication systems must be reexamined.

Thus, especially in the case of universities distant from the centre of the systems, these institutions should not be expected to draw on their operating funds to pay all of the expenses relating to the use of these systems by students and teachers (attendance at conferences, etc.). Also, most universities cannot make it easy for their students and research faculty to have access to foreign systems. Yet the latter are indispensable for a researcher, particularly in highly specialized disciplines which are little developed in Canada and ignored by the existing Canadian systems.

For researchers to have access to scientific communication systems, it is necessary to ensure equal opportunity for everyone within the system. Therefore, the aid granted to beginning or more distant researchers must be greater than that given to more established researchers or to those who are close to the

centre of the system. Since universities alone cannot provide this aid, it will have to come from the usual granting bodies, particularly the Canada Council, via the institutions of the system such as scholarly societies. The Canada Council already provides grants to associations which, in turn, help members pay expenses for attendance at annual meetings of their association. Unfortunately, as a result of the budgetary constraints of the last few years, universities have tended to reduce funds for attendance at scientific conferences and, at the same time, the Canada Council has been providing fewer grants. This trend of declining funds must be reversed and considerably more funds must be made available to researchers to allow them to participate fully in the scientific communication systems.

Furthermore, the various systems must themselves receive adequate funds to serve users. Publication of scientific journals, protection and promotion of the professional and disciplinary interests of members, participation in national and international associations, and information bulletins are costly services which cannot be covered by membership fees. Any scholarly society aiming to be self-supporting would be on a suicidal course, since some of its members would ultimately find the cost of participating in the system too high in relation to the benefits derived. The Canada Council must therefore constantly modify the financial aid already granted to national associations in relation to the growing expenses of their services.

CONCLUSION

During our time, mass university teaching, professionalism of graduate studies and university research have given rise to complex problems. Their solution is possible only by reconsidering the university as a whole.

To acknowledge the teacher's right to conduct research implies that the privileges and obligations following from this right are outlined in general terms. It is necessary to determine with much greater accuracy than has been done to date the nature of university research, especially its interaction with social and cultural development, the training of researchers and teaching. The best organizational methods must also be specified: internal research structures, individual or team research, research infrastructure. In studying these aspects, we have sought to promote a better structure for research faculty.

University or nonuniversity research has its own constraints. It cannot permit the detrimental compromises which some university administrators, certain private and public sectors, as well as funding bodies, propose for the purpose of maintaining the balances they advocate between the various functions of the university and the multiple roles of teachers.

Notes

1. Naturally, funds allocated to research are included in the infrastructure of research. Because of its importance, financing will be studied separately.
2. On the consequences of using computers in the social sciences, see Herbert Jacob, "Some Consequences of the Development of Scientific Social Sciences", in Stephen D. Kertesz, ed., The Task of Universities in a Changing World (Notre Dame, Ind.: Notre Dame Press, 1971), pp. 92-110.
3. The Canada Council, Report of the Consultative Group on Survey Research, (Ottawa: 1976). The members of this working group were Raymond Breton (Chairman), Jacques Brazeau, Léon Dion, David Elkins, Maurice Pinard, Jenny R. Podoluk, Mildred A. Schwartz, Fred Schindeler and Harry Eastman (observer from the Council's Advisory Academic Panel). The working group limited its work to quantitative research. The Institute for Behavioral Research at York University has just set up a committee to study qualitative indicators.
4. "Summary of Findings and Recommendations", Survey Research, pp. x-xi.
5. Raymond Breton, director of the Revue canadienne de sociologie et d'anthropologie/Canadian Review of Sociology and Anthropology, vol. 12, no. 1, (1975) pp. 1-5. Canadian learned societies have had relatively few major conflicts such as the ones which are now dividing some American learned societies, for example the American Political Science Association. See Theodore J. Lowi, "The Politization of Political Science", American Politics Quarterly, vol. 1, no. 1, (1973), pp. 43-71.
6. Report of the University of Toronto Task Force, pp. 70-71.
7. Quoted in Claude Bissell, Halfway up Parnassus. A personal account of the University of Toronto, 1932-1971 (Toronto: University of Toronto Press, 1974), p. 85.
8. Unless otherwise specified, these data and comments are taken from a study prepared for the Commission by William Watson and Basil Stuart-Stubbs, Canadian Universities Libraries and Research in the Humanities and Social Sciences, University of B.C. Library (September, 1975). The Report of the University of Toronto Task Force contains other useful information. In 1939-40 McGill and Toronto had 394,050 and 368,280 volumes respectively, and thus ranked twenty-seventh and twenty-eighth among North-American universities. Apart from Toronto and McGill, only Laval had over one hundred thousand volumes. Laval owed its collection to the patient labors of the priests from the Quebec Seminary; for over a hundred years they had been collecting early writings on New France and on the beginnings of the English regime, old letters and works on classical philosophy.
9. The Humanities in Canada (Ottawa: Humanities Research Council of Canada, 1947), p. 157.

10. Resources of Canadian University Libraries for Research in the Humanities and Social Sciences, Report of a Survey for the National Conference of Canadian Universities and Colleges (Ottawa: National Conference of Canadian Universities and Colleges, 1960), p. 61.
11. Graduate Studies in the University of Toronto, The Report of the President's Committee on the School of Graduate Studies, 1964-65 (Toronto: University of Toronto Press, 1966).
12. Listed here are most of the universities that ranked first according to the indicators of excellence used in the chapter on the nature of graduate studies. (See especially Section one, chapter V.) However, the last university on the list of second-ranking universities, Laval, with 1,000,000 volumes, comes only in seventieth place among the North-American university libraries.
13. Report of the University of Toronto Task Force, pp. 71-72.
salaries, the University of Toronto did not spend any more on its library in 1973-74 than it did in 1969-70. Given inflation, the real budget for books, periodicals and documents decreased by 13.67 per cent in 1973-74 and by 9.34 per cent in 1974-75
14. There are over three million cards in the main card catalogue, to which 6,000 new titles from 300 different libraries are added each day.
15. It may well be argued that no university has a total budget large enough to allow an adequate allocation for library needs. This raises two issues - the size of the total budget and the proportion which should be spent on library acquisitions. Neither of these issues, however, fall within the sphere of the federal government or the Canada Council.
16. Herbert Menzel, "Planned and Unplanned Scientific Communication", Proceedings of the International Conference on Scientific Information, (1959), pp. 189-212, published also in Bernard Barber, Walter Hirsch, op. cit., pp. 417-441.
17. W.D. Garney et al., "A Comparison of Scientific Communication Behavior of Social and Physical Scientists", Proceedings of the Symposium on Communication among Scientists and Technologists, (Lexington, Mass.: Heath, 1970). The differences in publishing time for manuscripts submitted to specialized journals in the natural sciences and in the social sciences reveal that the natural sciences communication network is much more efficient. Indeed, the proportion of manuscripts that are returned once to their authors is much higher in the social sciences than in the natural sciences (33% and 12% respectively). Specialized journals in the social sciences are eight months slower in publishing manuscripts than natural science journals (13 months compared to five months) in cases where the manuscripts are accepted immediately; they are 10 months slower if the manuscripts have been returned once to their authors to be revised (20 months in the social sciences compared to 10 in the natural sciences). In a given

year, only 33 per cent of social science manuscripts have been published compared to 60 per cent in the natural sciences. In the next section we will attempt to explain why the vast scientific communication network of specialized journals is so inefficient in the social sciences.

18. A survey conducted by Donald G. Marquis and Summer Myers concludes that "most of the information came by word of mouth and less than 10 per cent from printed material", quoted in the Report of the Senate Special Committee on Science Policy, A Science Policy for Canada, vol. 2 (1972), p. 386. The information referred to here is the information used in innovations.
19. It is relatively easy for Canadian researchers to gain access to foreign research institutes, notably American ones, and this makes up for the dearth of similar scientific communication networks in Canada. But this aspect of the question should not be neglected. Earlier we mentioned the report of the team set up by the Canada Council to study various aspects of survey research. We have adopted the team's recommendations and have concluded that outside help is needed to promote the expansion of the York Institute for Behavioral Research and the Survey Centre of the University of Montreal. These two centres are the main channels of their particular communication network. As for the specialized journals, the people in charge should remedy the extremely slow publishing process.

1. Introduction

Many individuals to whom we talked argued that the only significant problem was insufficient money available for university research. If governments and other contributors could be persuaded to provide adequate funds, the universities could produce the amount and quality of research that Canada needs. This widespread conviction rests on the unspoken - or unconscious - assumptions that governments and universities are agreed upon the objectives of university research, and that the necessary institutions and infrastructures already exist or can easily be created. Therefore, the only significant variable would be the amount of money available for university research.

We are certainly concerned with the level of funding for university research in Canada. We are convinced that the level of funding is the result of complex factors, including assumptions about the benefits of research and the appropriate role for university research. In other words, we disagree with those who believe that more money would solve most of the problems of university research. This seems to us a dangerous oversimplification because it ignores factors which will eventually determine the level of social investment in research. Any major change in the level of available funds will be the result of changing views on the benefits of research in general and the benefits of university research in particular. To argue for more - or less - money for university research without discussing this broader context is a waste of time.

How university research is financed today must begin the discussion. Who pays for university research in Canada? What proportion of research funds go to the human sciences? How much of this in turn goes to free rather than oriented research? Where is the research performed? How much of research in Canada is conducted at Canadian universities? What proportion of this research is in the human sciences? What proportion is free research? The answers to such questions will not tell us what should be done; they will, however, help us to understand what is being done and what trends and patterns are emerging.

Data on the financing of university research are far from adequate. Neither governments nor universities can provide comprehensive and completely accurate statistics on their investment in research or on the amount of research

conducted. It is not enough, however, to suggest that accounting procedures should be improved. Statistics on research depend upon a precise identification of research activities, and this identification is still being debated. In the case of universities, there is no easy distinction between research and teaching. If a university is considered primarily a teaching institution, the work a professor does in preparing for his lectures or in supervising a graduate student will be classified as teaching. If the primary function of the university is considered to be research, the same activities might be classified as research. The statistics on research depend on the definition of research.

In many cases, this definition is not explicit, and the individuals who supplied the raw data may have interpreted their instructions in contradictory ways. The statistics on research in the human sciences are especially vulnerable because their collections have been started only recently and conventions are not yet established. Even if the figures are not exact, they can be revealing. They permit some comparisons, and the changes over time indicate trends and patterns which may be more significant in the long run than exact totals.

2. Foreign Comparisons

A comparison of Canadian expenditures for research with equivalent expenditures in other countries is a logical place to begin. The Special Committee of the Senate of Science Policy compared the expenditures for research and development and concluded that the correlation between Canadian expenditures and the number of qualified scientists and engineers was close to the mean of the other countries studied, although when expenditures were expressed as a percentage of its gross national product, Canada trailed behind most of these countries. When the committee compared the source of the funds provided for research and development, however, the Canadian pattern appeared unusual. In Canada, the share contributed by governments was higher than for most countries, and the share contributed by business enterprise was lower. In part, this might be seen as a North American pattern, because in the United States the public share was even higher and that of private industry was almost as low. The marked difference between the United States and most other countries was the higher proportion of research and development funds contributed by Canadian universities.¹

Research financing is only part of the story. The comparison of where this

research is performed also shows the importance of university research and development in Canada. The proportion of the research and development conducted by Canadian business enterprise was significantly lower than it was in any other country, and the research and development performed by governments and universities was significantly higher.² The Senate Committee also noted that this pattern seemed firmly established and that, in the decade from 1957 to 1967, the proportion of research and development conducted in the academic sector had increased from 8 per cent to about 25 per cent.³

In commenting on these figures in 1970, the Committee concluded that the prominence of university and government research reflected a relatively stronger emphasis on basic and applied research than on innovation and development, and it argued that this emphasis was misguided. "Empirical evidence," according to the Committee, "shows that the ideal location for R&D is where their results can be used; that is, where the innovation can be developed and introduced. This location, in an economic system mainly based on private initiative, is in industry. On that basis, at least, what most other advanced countries are doing seems to be right, and Canada appears to be on the wrong track."⁴ The Committee may have had some effect on the subsequent pattern. Federal government expenditures for research and development in the natural and human sciences almost doubled from 1970-71 to 1976-77, rising from \$631 million to \$1,045 million, but federal funds used to finance research and development at Canadian universities rose from \$123 million to only \$174 million in that period - an actual decline from 19.6 per cent to 16.7 per cent of the total federal expenditure.⁵

The debate over the present science policy for Canada should not be allowed to overshadow the relative prominence of Canadian universities in the conduct of research and development. As international comparisons show, an unusually large proportion of the research conducted in Canada is performed in universities. In part, this seems to be a North American pattern; the universities of the United States have clearly been in the forefront of American research. North American universities have traditionally had a vocational orientation and a strong emphasis on public service. This may explain why these universities have responded so positively to the growing demand for research since the Second World War. A recent OECD report made the point that the expansion of university research has been even more dramatic in Canada than the

expansion in the United States because, until recently, university research in Canada had been so undeveloped. A consequence of this rapid expansion was that research tended to be much more dispersed than in the United States, with a proportionately larger number of universities sharing the research activity. Essentially, in Canada, as in the United States, the universities have played a far more prominent role in research and development than they have in other industrialized countries, and these institutions have proved to be extraordinarily flexible and adaptable.⁶

Most data studied by the Senate Committee and the OECD report were related to research in the natural sciences. This was not entirely by choice. These data were more easily obtained because governments have long been convinced that there is a connection between the level of research and development in the natural sciences and economic efficiency and growth. The Senate Committee and authors of the OECD report, however, stressed the importance of research and development in the social sciences as well and regretted that comparable data were not available. More recently this concern has been shared by governments, and more concerted efforts have been made to collect information about research in the human sciences. It will be some time before uniform definitions and criteria are adopted, and the data are therefore less complete and less reliable than for the natural sciences. Nonetheless, it is possible to draw some broad conclusions from the data now available.

The OECD has already collected some data on research in the human sciences in a number of industrialized countries. No data were available from the United States, and the data from Canada were too incomplete to permit useful comparisons. The preliminary findings of this study draw attention to patterns which may be relevant to the Canadian situation. For example, in those countries which provided data, business enterprises undertook almost no research in this area, in contrast to their contribution to research in the natural sciences. Research in the human sciences is thus almost a monopoly of governments and universities. The funds come mainly from governments; the government share was more than 80 per cent of the total research costs for each of the reporting countries. The data on the actual performance of the research were equally striking; universities performed almost twice as much of the research as did governments.⁷ Given the relative prominence of Canadian universities in other

areas of research and development, it seems probable that comparable data for Canada would show they are similarly playing a prominent role in research in the human sciences.

3. Federal Research Expenditures at Canadian Universities

There is no reason to doubt that governments, in Canada as elsewhere, are the major source of funds for research in the human sciences. A very large proportion of all such research at Canadian universities is financed by governments, because most research contracts, grants or fellowships in this area come from public agencies, and most of the research paid out of university budgets is paid indirectly by governments. In any discussion of research patterns and research trends, there is an important distinction to be made between public funds allocated directly to university research by governments and funds distributed by university administrators. The former are likely to reflect government research policy more directly than the latter. Their impact on research trends is usually more significant, because university budgets have levelled off in recent years, whereas government investment in research has been expanding.

In Canada the pattern is complicated by the federal system. Government investment in research includes the investment of provincial governments as well as that of the federal government. The data for provincial governments are not always available, and those that are may not be comparable to federal data. For our purposes, even looking at the federal data alone can be instructive. Provincial research expenditures at Canadian universities are increasing and may be increasing more rapidly than federal expenditures, but the federal investment is still significantly larger. In 1974-75, for example, it is estimated that direct provincial payments to universities for research activities in the human sciences totalled some \$15 million, compared to the equivalent federal expenditures for that year of \$33 million.⁸ If comparable breakdowns for provincial expenditures were available, they would probably reflect the same pressures that have affected federal expenditures in recent years and would reinforce or accentuate patterns which may emerge from available federal data.

A comparison of federal investment in the natural sciences and in the human

sciences is revealing. Total federal expenditures for scientific activities - which include research and development, collecting data, storing and disseminating information and supporting graduate studies - have been rising steadily and have almost doubled between 1970-71 and 1976-77, increasing from \$916 million to \$1,724 million. Most of this money goes to the natural and life sciences, but scientific activities in the human sciences increased more rapidly, rising from \$140 million in 1970-71 to \$434 million in 1976-77, or from just over 15 per cent of total federal expenditures on scientific activities to just over 25 per cent.⁹

A further breakdown of these figures reveals another important difference between federal investment in the natural and the human sciences. Expenditures for scientific activities can be separated into two broad categories: research and development, and related scientific activities. Of current federal expenditures for scientific activities in the natural and life sciences, over two-thirds go to research and development. In the humanities and social sciences, the distribution is reversed and only about a quarter of the total goes to research and development; and this distribution has remained almost constant despite increases in total federal expenditures in the human sciences in recent years. In other words, federal expenditures for scientific activities in the human sciences are not only less than in the natural sciences, but the proportion spent directly on research and development is much lower. More of the money goes to ancillary activities, such as the collection of data. It is therefore not surprising that by 1976-77, of the total federal expenditure on scientific activities in the human sciences, two-fifths was spent by Statistics Canada.¹⁰

Data collection is a necessary preliminary to most research, but it is only a first step. Until the data are analyzed, or used to develop or test new hypotheses and interpretations, they make no contribution to our knowledge. There may be no ideal balance between the investment in research and development and the investment in ancillary scientific activities. It seems, however, that an increasing proportion should be devoted to analyzing the data which are being collected.

Within the narrower category of research and development, total federal expenditures rose from \$613 million in 1970-71 to \$1,045 million in 1976-77. Of

these totals, federal expenditures for research and development in the human sciences amounted to only \$43 million, or 7 per cent, in 1970-71 and \$123 million, or 12 per cent, in 1976-77. The increase in amount and percentage is certainly significant, but even in 1976-77, only one federal dollar out of eight spent on research and development went to the human sciences.¹¹

The distribution of federal funds for scientific activities is only one side of the story. It is important to remember that federal expenditures for scientific activities in the natural sciences still outstrip those in the human sciences by a ratio of 3 to 1, even though the expenditure in the latter is increasing at a more rapid rate. In the more limited category of research and development, federal expenditures are seven times as large in the natural sciences as in the human sciences. There is also the question of which agencies perform the research and, more specifically, what proportion of this research is performed in Canadian universities.

Here the contrast between the natural and the human sciences is less marked. Broadly speaking, the federal government spends over half its research budget on internal research and development projects, and about one-sixth of the total goes to university projects. The total for the natural sciences was much higher than for the human sciences - being \$114 million in 1970-71 and \$149 million in 1976-77 - compared to \$10 million and \$25 million respectively for the human sciences. In relative terms, however, the universities fared slightly better in the human sciences, since the above figures represent 20.9 per cent of current federal research and development expenditures in the natural sciences in 1970-71 and 17.4 per cent in 1976-77, in comparison with 23.1 per cent and 20.8 per cent respectively of current federally-sponsored research and development expenditures in the human sciences.

The significance of the universities as performers of federal research is underlined by a comparison with the federal research performed by business enterprises. In the natural sciences the federal government paid slightly more to business enterprises than to universities for research in the years under discussion - 26.3 per cent of the total in 1970-71 and 21.7 per cent in 1976-77. In the human sciences, business enterprises performed very little research and development for the federal government, ranging from 5.4 per cent of the total in 1970-71 to 7.9 per cent in 1976-77. Even these figures may understate the

importance of federal research in the human sciences performed at universities. In the last few years the federal government has sharply increased its expenditures abroad in this area as part of its contribution to economic development in other countries. If we exclude these expenditures in other countries from our calculations, the university share of total federal research and development expenditures in the human sciences would have risen to 25 per cent by 1976-77. In other words, of the federal research and development in this area conducted within Canada, apart from that performed by federal agencies, more than half is performed by Canadian universities.¹²

The implications of this for university research are not necessarily encouraging. There may be some satisfaction in seeing that Canadian universities continue to perform a significant proportion of federally-funded research and development in the human sciences and that the total amount involved has been increasing annually. At the same time, there is always the danger that this directly funded government research may be inconsistent with the long-range interests of the university. It is enough to recall that university research should contribute to or be consistent with the universities' responsibilities for undergraduate education, for the training of researchers and for the social and cultural development of society. Any trend by a major sponsor of direct research to define more narrowly the area or scope of the research for which its funds may be used, to impose methods and procedures or to insist on a close correlation between the research and the policy interests of the sponsor is hazardous for the university. Some tension is inevitable between the sponsor of the research, investing for its own benefit, and the university, which has different objectives. In a subsequent chapter we will discuss the need for increased university control over university research. For the moment, we are concerned only to show that the expansion of federally-sponsored university research, encouraging as it may seem, is disquieting, because it seems to entail an extension of federal control over the subject matter and orientation of this research.

Most direct government expenditures on university research can be classified in three broad categories: research contracts, grants and fellowships. Within each category there may be wide variations in the role of the sponsoring department or agency on the one hand and the university researchers on the other.

The initiative for the project may come from the government or from the researcher, and the elaboration of the project and agreement on the methodology may be the result of lengthy discussions with considerable input from both sides. In general, however, research contracts are more likely to reflect the interests of the government department or agency because, for most contracts, the government has decided what information it wants and is paying for the research to get this information. Under existing arrangements any benefits to teaching, to the training of graduate students, to the advancement of the discipline or to broader social and cultural goals are fortuitous, and additional costs for any of these purposes have no legitimate place in such a contract.¹³ It is often a matter of indifference to a government department or agency whether it negotiates with a private entrepreneur or a member of a university faculty.

Research grants, in contrast, are more likely to reflect the interests of the researcher. The granting agency will exert a good deal of influence, because its regulations will determine the eligibility of projects for a grant and the criteria upon which grants will be awarded. In some cases there is little distinction between a research contract and a research grant. Usually, however, the initiative for a specific research project comes from the researcher in the form of an application which states the objectives and outlines the methodology. In many cases, this application will be assessed by other academics. In general, research grants can be distinguished from research contracts because the grants have objectives which go beyond the mere production of needed information, and are intended to contribute to the professional development of the researchers and to the advancement of knowledge or methodology within a discipline or field of study. In this way, research grants are more congruent with the broader objectives of the university.

Research fellowships tend to coincide even more fully with university objectives. Again, the terms of a fellowship may be restrictive but, in general, the emphasis is on the potential ability of the scholar, and there are fewer regulations relating to the research topic or the methodology. The emphasis of fellowships is on the development of the scholar and so may be a contribution to university teaching and to graduate training as well as to the expansion of knowledge.

In Canada, the pattern of federal investment in university research in the

human sciences over the past few years suggests a definite shift toward policy-oriented research. The federal government has increased its expenditures on research, and its total payments to Canadian universities for contracts, grants and fellowships in the human sciences have almost doubled, from \$13 million in 1972-73 to almost \$25 million in 1976-77. At first glance, it is reassuring to note that the proportion allocated to each of the categories of research assistance has remained almost constant. Research and development contracts fluctuated around 10 per cent, research and development grants rose from 62.9 to 68.6 per cent, while research fellowships declined slightly, from 23.7 to 21.2 per cent. The modest drop in the proportion allocated to fellowships might be interpreted as appropriate at a time when the total number of faculty and graduate students was levelling off.

The breakdown of these federal expenditures by departments and agencies is of much greater concern. Of the federal agencies involved, only the Canada Council is committed to the advancement of research in all disciplines in the human sciences. Only the Canada Council seeks a balanced development among these disciplines. It is therefore disturbing to note that, among the federal agencies, the relative importance of the Canada Council has steadily declined. In 1970-71 it distributed 71.3 per cent of total federal payments to Canadian universities for scientific activities in the human sciences, but by 1976-77 the Council's share had dropped to 58.4 per cent.¹⁴

The major donors among the federal departments and agencies distributing these funds for scientific activities were Health and Welfare Canada, the Canadian International Development Agency, the Secretary of State Department and the Ministry of State for Urban Affairs. In each case, its proportion of the total federal expenditure has increased sharply since 1970-71. These departments and agencies are oriented toward policy formation in specific areas. They may be concerned with the development of research skills and methodology and with research capacity in their area of responsibility, but they are not, and cannot be expected to be, equally concerned with the advancement of research in other fields. They offer research grants and research fellowships as well as research contracts in the human sciences, but these grants and fellowships are confined to the sectors or disciplines appropriate to their interests.

Statistics do not prove that the present allocation of federal funds for

university research in the human sciences is imbalanced, but there does appear to be a trend toward federally-sponsored research which is initiated and defined by federal departments. The Canada Council's budget may still be adequate to support graduate studies and research in areas and disciplines which are remote from the policy concerns of federal agencies. It may also be adequate to support other projects which focus on areas in which the federal government has an interest but which may appear to be critical of government policy. The trend is disturbing, because even if there is no imbalance yet, there will be, should the trend continue.

The disturbing trend toward mission-oriented research in the human sciences is underlined by a comparison with the trend in the natural sciences. As we have noted, total federal payments to universities for scientific activities in the natural and life sciences are almost four times as large as equivalent federal expenditures in the human sciences, although the margin has been declining. In this area, the two federal agencies which distribute most of the federal funds are the National Research Council and the Medical Research Council, followed in 1976-77 by the departments of Health and Welfare, Environment, and Agriculture. In contrast to the pattern in the human sciences, the proportion of federal funds distributed by the research councils has been increasing steadily, from 74.3 per cent in 1970-71 to 82.8 per cent in 1976-77.¹⁵ If this is an appropriate pattern in the natural and life sciences, the decline in the relative importance of the Canada Council in federal support for research in the human sciences should not only be halted but reversed.

Federal support for the Canada Council has increased in recent years. It is important to remember that only a portion of the Council's budget goes to the humanities and social sciences. The Canada Council has a responsibility to support the arts as well as the humanities and social sciences. In its early years, the Canada Council determined the division of its funds. By the mid-1960s it was allotting slightly more to the arts; in 1965-66 this amounted to \$3.4 million compared to \$2.8 million for the humanities and social sciences. About this time, the federal government increased the Council's budget but intervened to the extent of determining the way in which the money would be allocated.¹⁶ These two developments were almost certainly linked. The government at that time saw the desirability of university expansion, especially at the graduate

level, and its increased grant to the Canada Council was intended primarily for the academic side of the Council's operations. By 1969-70, the budget allotted to the arts had risen to \$9.4 million, but in relative terms this was by then only 35 per cent of the total budget. The budget for the humanities and social sciences, in contrast, had expanded to \$17.1 million and accounted for 65 per cent of the Council budget.

The balance has subsequently shifted, this time to the benefit of the arts. By 1976-77, the humanities and social sciences budget had risen to \$27.8 million, but the arts budget rose even more sharply and in this year reached \$32.6 million.¹⁷ It bears repeating that this allocation of funds has been a government decision and not a policy determined by the Canada Council. This is presumably a reflection of the political process and attests to the enhanced prestige of the performing arts or the greater influence of advocates of the arts. Conversely, in relative terms, the prestige of the humanities and social sciences or the influence of their advocates has diminished.

There are a number of other comparisons which add a further dimension to the implications of these figures. The actual Council budget for the humanities and social sciences rose from \$18.2 million in 1970-71 to \$27.8 million in 1976-77, a compound annual rate of increase of 23 per cent. The equivalent increase in the arts for the same period was \$10.3 million to \$32.6 million, or 31.2 per cent per annum. Another revealing comparison is with the budgets for both the National and the Medical Research Councils, which rose from \$98.8 million to \$143.7 million in this six-year period, at an annual rate of increase of 6.4 per cent. Yet another comparison is with total federal expenditures on scientific activities in the humanities and social sciences, which increased from \$136 million to \$433 million, or at an annual rate of increase of 21.1 per cent. Expressed in constant dollars, the Canada Council budget for the humanities and social sciences would be smaller in 1976-77 than it was in 1970-71. Even in relative terms, the pattern of federal support for independent research in the humanities and social sciences for this period compares unfavorably with the pattern of federal support for the arts, for the natural and medical sciences and for directed research in the humanities and social sciences. These statistics cannot tell us what the proper level of federal funding should be. They do show that funding for independent research in the humanities and social

sciences has been less generous than federal funding in other areas. Although independent research may not disappear, it may gradually diminish, should this trend continue.

The pattern which we have been describing is based on federally-sponsored research and development. Provincial governments also sponsor research, and increasing provincial payments for university research could affect this pattern. At the moment, the evidence suggests that provincial expenditures only reinforce the trend toward government-initiated and policy-oriented research. As we noted earlier, provincial expenditures on research are sizeable, although they total less than federal government expenditures. Statistics Canada estimates that in 1974-75 total provincial expenditures on scientific activities in the natural sciences amounted to \$150 million, compared to the federal expenditure of \$1 billion, and in the human sciences to \$100 million, compared to \$300 million. Only a portion of this money is spent on scientific activity at Canadian universities; for the human sciences, the estimate is \$15 million, compared to federal expenditures of \$33 million. Even these data do not tell us how much of this provincial expenditure goes to oriented research and how much to free research. The sketchy information we have from university sources indicates that very little of this provincial money goes to free research.

University research in the humanities, for example, which is mainly free research, appears to rely almost entirely on funds supplied internally by the university or on grants from the Canada Council. The task force of the University of British Columbia provided us with data from that institution which make this point forcibly. The total funds provided for UBC faculty research projects in the humanities over a five-year period from 1970 to 1975 came to some \$600,000. Of this amount, \$166,000 came out of university funds; of the balance, some \$420,000 or 90 per cent came from the Canada Council. Data assembled for the Commission by some Ontario universities are less conclusive but reinforce the impression that provincial governments do not make a significant direct contribution to free research. For 1973-74, these universities reported that the humanities received only 1 per cent of the total funds provided for faculty research. Of this amount, one-quarter came from within the university and almost three-quarters came from federal sources, presumably from the Canada Council.

The data on research funding in the social sciences are less conclusive, because some money is spent on oriented research but no breakdown is available between oriented and free research. At the University of British Columbia, from 1970 to 1975, of some \$3 million for faculty research in the social sciences, some \$400,000 came out of university funds, and one-third of the balance came from the Canada Council.¹⁸ The remaining two-thirds came largely from federal and provincial agencies, but it seems likely that most of it went to oriented research. The data from Ontario universities for 1973-74 are consistent with this conclusion. In these institutions, about 9 per cent of the total funds available for research went to the social sciences. Of this amount, 7 per cent came from the university budget and 63 per cent from federal sources. Much of the remaining 30 per cent doubtless came from provincial sources, but there is no evidence that any significant proportion of this money went to free research.

The data we have been discussing are incomplete, but they do reinforce our concern that free research is steadily losing ground to oriented research. We have seen this trend in the pattern of federal investment in research, and the provincial emphasis on oriented research seems even more dominant. With the exception of the province of Quebec, there is no provincial agency or program specifically committed to supporting free research in the human sciences.¹⁹ Provincial governments are likely to sponsor more and more research in the future but, unless they modify their present funding pattern, almost all of their additional funds will go to oriented research.

4. The Canada Council

In relative terms, the financial contributions of the Canada Council to research in the humanities and social sciences is becoming less important; even as a proportion of federal payments to universities for research in this area, the Council's contribution has declined from 71.3 per cent in 1970-71 to 58.4 per cent in 1976-77. If we add to this the rising provincial payments for university research and the increasing sums provided by the universities' budgets, the Canada Council's share of the total becomes even smaller. It is not surprising that the reports of some of our task forces made the point that the Canada Council's contribution to fellowships and research funds has become relatively

minor.²⁰

This does not mean that the importance of the Canada Council has diminished. It remains the only significant source of federal funds for university research in the human sciences which is not oriented research. What is more, because so little provincial research funding goes to free research, and because university research support is limited, the Canada Council is almost the only potential source of fellowships or research grants in some disciplines. In our discussion of the data from the University of British Columbia we stressed the limited provincial investment in research in the human sciences. The same figures can be used to show the prominent role of the Canada Council, which provided one-third of nonuniversity support for research in the social sciences and an astonishing 90 per cent of outside support for research in the humanities. For some disciplines and some scholars, the Canada Council has been almost the only source of research funds outside of the university.

The Canada Council has been in existence for only 20 years, but already it is difficult for most scholars in the human sciences to imagine scholarship without its existence. Initially, the Canada Council was endowed with \$50 million, with the revenue to go to the arts, humanities and social sciences in Canada. By 1965, it had become obvious that this revenue was inadequate, at a time when graduate studies were expanding and the demand for trained scholars had spiralled. The federal government, therefore, supplemented the Council's revenue by an annual appropriation. This federal grant soon became the Council's major source of revenue; the total budget for the humanities and social sciences, which averaged \$1.2 million for the first eight years, had risen to \$25 million by 1975-76.

a. Relations between the Canada Council and the Federal Government

Annual appropriations have subtly changed the relations between the Canada Council and the government of the day. The objectives of the Council are still those defined by the Canada Council Act of 1957 - "to foster and promote the study and enjoyment of, and the production of works in, the arts, humanities and social sciences"²¹ - and the only formal link with Parliament is the obligation to submit an annual report. When the Council's funds came from its endowment, its income was inadequate, but the Council did not have to concern itself unduly

with shifting public attitudes. The dependence on appropriations meant increased resources, but also a greater awareness that its income depended on the good will of the legislators. There is always the possibility that the Council will try to curry favor or that the size of the annual appropriation will reflect dissatisfaction with some aspect of the Council's activities.

The risk of undue government influence or intervention seems even greater with the reorganization of the Council. The new Social Sciences and Humanities Research Council, instead of reporting directly to Parliament, will report through a Minister and, potentially, may be exposed to closer and more frequent scrutiny by the government of the day and by the Opposition. While the new Council should be accountable publicly for its administration of public funds, its judgment of how best to foster and promote the humanities and social sciences should not be too easily swayed by the attitudes or preferences of those who hold the purse-strings. As long as the government of the day decides the size of the Council's annual budget, the possibility of political interference exists.

This concern is not completely dispelled by pointing out that the new Social Sciences and Humanities Research Council will conform to the established pattern of the National Research Council and the Medical Research Council, which report through a Minister. Even if the past experience of these other Councils is considered reassuring, the same structures may not be appropriate for research in the human sciences. Research in the natural and medical sciences is less likely to be controversial. Scientific discoveries may revolutionize our lives, but there is less suspicion that philosophical or partisan bias will color research results. When natural scientists disagree, the problem is assumed to be with the data; if all the facts were known, presumably all scientists would agree with their interpretation of these facts. So-called scientific knowledge in these disciplines is believed to be objective.

The attitude toward knowledge in the humanities and social sciences is quite different. There is for many what amounts to almost a faith that all scientific research is relevant, because any addition to our understanding of nature and nature's laws brings us closer to understanding the universe. There is more readiness to believe that some research in the human sciences is an esoteric pursuit of knowledge for its own sake, with little or no relevance to

contemporary concerns. A translation of Norse sagas or a study of medieval Florentine politics seems more esoteric than an erudite paper on the molecular structure of a chemical compound which exists only in a laboratory test tube. The distinction between what is and what should be is also more sharply drawn in the human sciences; accumulating more data on learning a second language, for example, does not tell us how many Canadians should be bilingual. Politicians, like the broader public, have more personal experience with the subject matter of the humanities and social sciences and are more inclined to trust their own judgment of what studies are relevant and what conclusions are valid. There is therefore a greater danger that governments will interfere in the administration of the Social Sciences and Humanities Research Council than in the administration of the National Research Council or the Medical Research Council.

The relationship between governments and research councils can also be affected by the attitude of researchers toward government policy. Natural scientists may be sharply critical of some government policies, but a distinction is usually drawn between the criticism of a scientist acting as a scientist and the criticism of a scientist acting as a citizen. When scientists deny that the CANDU reactor is the most efficient way to produce nuclear power or that spraying insecticide is the best way to control the spruce bud-worm, they may be criticizing government policy; but they are challenging means, not ends, and are basing their arguments on scientific knowledge. The effectiveness of their arguments is assumed to rest on their scientific validity. If other scientists, however, attack CANDU because they believe that the generation of nuclear power is dangerous and irresponsible or oppose spraying New Brunswick forests because of the unknown hazards of pollution, their arguments are seen as less objective and less scientific. A scientist who carries a placard for such causes does so as a citizen and not as a scientist. The distinction is never completely satisfactory; Bertrand Russell's prestige as a scientist doubtless gave weight to his opposition to nuclear armaments. For the humanists and social scientists, the distinction between the scientist and the citizen may be almost impossible. For them social criticism is a scholarly activity, and they have a professional obligation to discuss ends as well as means, to concern themselves with social objectives as well as social structures. An

economist commenting on government fiscal policy may argue that it will not achieve its objective of controlling inflation, but he will likely not stop there; he will refer to the probable effect on employment as well and will express or at least imply a value judgment of the government's objective. Similarly, an urban geographer can hardly comment on the effect of zoning regulations without making judgments about proper use of land. The distinction between the natural scientist acting as a scientist or as a concerned citizen is difficult to make; for the humanists and social scientists it is far more difficult. Governments may rely on the advice of humanists and social scientists in formulating policy, but they are naturally resentful when other scholars use their prestige as scholars to criticize the policy objectives. The same governments may extend their resentment to a research council which supports these critics by giving them fellowships and research grants.

It is easier to explain than to resolve the dilemma. Public funds are needed for research in the humanities and social sciences. In these areas, however, governments are more confident of their assessment of what research is relevant and what results are valid, and are more sensitive to criticism. They are, therefore, more likely to use the power of the purse to influence a research council in the humanities and social sciences. The obvious protection against undue interference is a research council budget which does not depend on annual appropriations: either a fixed budget or a budget which varies according to some established formula. On the other hand, some degree of government influence is desirable. An independent research council could become unresponsive to new areas of social concern or to new methodologies. The size of the research council budget is also a legitimate concern of government. Eventually a fixed budget or a budget based on a formula could become patently inadequate for research needs, or it might become extravagantly generous. In either case, the government would have to intervene to reestablish an appropriate level of expenditure. What is needed is a research council for the humanities and social sciences which is independent of government but not too independent, responsive to government but not too responsive.

The difficulty of achieving the desired balance should not be exaggerated. Structures are important, but in the long run even structures are less significant than the will to achieve and preserve a balance between independence and

responsiveness. Past experience suggests that Canadian academics and politicians are alert to the dangers of partisan interference in research but recognize the importance of broader social objectives.

The experience of the Canada Council has been that for the last decade the government has determined the size of its budget by annual appropriations and the amount to be allotted to the arts and to the humanities and social sciences. Within the limits set by the budget the Council has, theoretically at least, been independent. It has doubtless been influenced in subtle ways by government preferences. It can be assumed, for example, that there is a direct connection between the political concern about the increasing number of non-Canadians teaching at Canadian universities and the Council's regulations limiting the eligibility of these newcomers for research grants and research fellowships. On the other hand, there have been radical students and faculty who were clearly at odds with the established order who nonetheless received research grants or fellowships from the Council. To an outsider, at least, it appears that the balance between responsiveness and independence has been commendable.

The conclusion to be drawn is that the major influence of governments on the Canada Council has been to determine the size of the annual budget for the humanities and social sciences. There is no need to underline the importance of this power of the purse. The policies of the Council and the ways in which the Council has distributed its funds have also been a major contribution to the pattern of university research funding. The Council's support for research has included a wide range of research activities, such as graduate fellowships, fellowships and grants to researchers, and a number of other programs intended to foster and strengthen research. These various programs and the distribution of funds among them have had a formative influence on graduate studies and university research in Canada.

b. Doctoral Fellowships

A major expenditure by the Canada Council in the humanities and social sciences has been for fellowships to graduate students. The Council was created when the expansion in Canadian university enrolment was under way, and almost from the beginning it gave a high priority to meeting the demand for university professors. In the words of its Annual Report for 1958-59, "The Council is

firmly convinced at present that the best expenditure for the major part of the funds it has available for the humanities and social sciences is for the development of scholars and potential teachers."²² This assistance took the form of doctoral fellowships. By the end of the 1960s this program absorbed almost 60 per cent of the Canada Council's budget for the humanities and social sciences.

Today there is general agreement that this emphasis on the staffing requirements of Canadian universities deserved this high priority. In the long run, the health of graduate studies in Canada would depend upon the ability of Canadian universities to cope with expanding enrolment at the undergraduate and graduate levels. As it was, there were too few Canadian graduates to meet the demand, and many faculty members were recruited from the United States and elsewhere. The proportion of foreign-born faculty has subsequently given rise to a prolonged debate. Without the Canada Council, the problem would have been much more acute.

The Council's emphasis on graduate fellowships has diminished during the 1970s. Its actual expenditures for this program dropped from \$11 million in 1970-71 to \$9.5 million in 1975-76 - a drop from 60 per cent to 37 per cent of the Council's total budget for the humanities and social sciences. This decline in support for doctoral candidates coincided with a declining demand for university professors. At first glance, it would appear the Council had responded to the employment opportunities at universities, without paying much attention to the possibility that university teaching is not the only career for PhDs and that there might be a need for graduates in the human sciences to become administrators or conduct research. The statistics on the success rates for applicants for doctoral fellowships, however, suggest that the initiative for the decline did not come from the Canada Council. The success rate of applicants in the years after 1970 differed little from the success rates of earlier years. The significant change was the decline in the number of applicants for doctoral fellowships.²³ The Council has not attempted to counteract the drop in applications, but neither has it deliberately restricted its support for doctoral students.²⁴

Another aspect of the Canada Council's doctoral fellowship program which has led to some criticism has been the willingness of the Council to support

doctoral studies at foreign universities. Throughout the 1960s Canada Council doctoral fellows more often studied abroad than in Canada; approximately 70 per cent studied abroad in 1965-66, and even as late as 1970-71 almost half of them did so. If more of these fellowship holders had attended Canadian institutions, graduate studies in the human sciences might have been strengthened. There is likely to be a positive correlation between the size of a graduate program and its quality, since larger enrolments would have justified increases in size of faculty and number of library acquisitions.

It is possible to defend the policy of the Council. Its priority in its early years was to promote the training of scholars and teachers. In most cases, the best training was provided in foreign universities, and the scholars and teachers who were trained abroad almost certainly helped to develop higher academic standards when they returned. The comparison with the National Research Council, which did insist on enrolment in Canadian universities, may not be valid, because in Canada the graduate faculties in the human sciences were less developed than in the natural sciences. Even by the 1970s, when some graduate schools had established high reputations, there remained some disciplines in the human sciences for which study abroad probably offered significant academic advantages. Students of non-Canadian languages or literature or history, for example, might not find the sources or the experts at home. The pattern has been changing; in 1970-71 only 50 per cent of Council fellowship holders were enrolled in Canadian universities, but by 1975-76 this had risen to 67 per cent. This major shift, however, must be attributed to the choice of the candidates themselves because the Canada Council still exerts no pressure. Graduate training in Canada in the human sciences is well enough advanced to justify some positive encouragement for doctoral students to enrol in Canadian programs.

c. Research Grants

The other major sector of Canada Council aid to the humanities and social sciences is aid to research. Most of this aid is direct assistance to researchers in the form of research grants and leave and research fellowships. These forms of research support have grown from \$700,000 in 1965-66 to over \$10 million in 1976-77 and, in relative terms, have increased from 23 per cent to 41 per cent

of the Council budget for the human sciences for this period.²⁵ Supplementing these programs, there have been a number of programs designed to support research less directly by developing the infrastructure, including grants for the publication of manuscripts and learned journals, for major editorial projects, for academic conferences and for library acquisitions. The wide range of these activities is an indication of the variety of activities and resources on which research depends and a testimony to the Council's efforts to support these activities and provide the resources.

Research grants from the Canada Council are neither large nor numerous, but to scholars in the humanities and social sciences their value cannot be exaggerated. In 1976-77, only 551 were awarded, for a total of \$5.25 million. These grants are of great importance, because of the terms on which they are awarded. They are limited to the humanities and social sciences and so are available to scholars who have few other sources of research funds. Even more significant, these grants are offered for independent research initiated by the scholar. As research projects they are expected to test hypotheses or to provide answers to carefully-phrased questions, but they are not confined to topics of immediate concern to governments or private enterprises. Canada Council research grants are also important because they provide an incentive and a reward for high academic standards; the applications are assessed by other scholars who apply academic criteria, and the grants thus go to scholars who have satisfied their peers. For many scholars in the human sciences, research is not expensive because the major requirements may only be time and access to certain books or documents. The Canada Council is not the only agency to offer research grants for independent research - there are some provincial and university and even private funds available on similar terms - but the preeminence of the Canada Council and the prestige of its awards is generally acknowledged.

The Canada Council has also introduced a new program of collective research grants. This program is designed to encourage large-scale research projects which are usually multidisciplinary and the grants extend over a period of up to five years. The Council envisages an eventual budget of some \$6 million per year for this program. Since the program is in its second year, it is too early to talk of results. The interest it has generated, however, suggests that it is a much-needed supplement to the more traditional program of individual

research grants.

The Council's program of research grants has not escaped criticism. Some scholars have felt that the progress reports required by the Council are unnecessary and bureaucratic. There is a more widespread debate over the costs which are covered by the research grants. The present program defrays such research costs as travel and subsistence, typing and photocopying, survey and computer costs, equipment and rent and salaries of research assistants. These are clearly legitimate research costs and their inclusion poses no problem; the only controversial question is whether the Council's allowance for such items as subsistence is adequate. On two other items, however, there has been a continuing debate: the Council does not include an allowance for the salary of the principal researcher nor any allowance for indirect research costs which the universities must pay. Some discussion of the policy on salaries and on indirect costs seems warranted because, in our opinion, the present policies of the Council should be changed.

The principal researcher is reimbursed for his research costs but is not paid by the Council for the time he spends on his research project. It is assumed that the researcher is a full-time employee of the university and that research is one of the activities for which he is being paid. We have already discussed the complex relationship between research and teaching at the individual and institutional levels. As we know, professors are expected to teach and to do research, but the link between the two activities is not clearly defined.²⁶ It has been argued that the inclusion of any payment to the principal researcher would make him independent of the university and make university planning much more difficult. In the words of a study group on federal aid to university research which reported in 1969:

The acquisition and retention of its academic staff is the most important element in determining the nature of a university. Canadian universities have budgets delicately balanced between high priority items. In this situation they find it difficult to turn down possible arrangements to acquire staff paid from funds outside their general revenues. Such arrangements can therefore strongly influence the basic nature of the university.²⁷

We do not find these arguments convincing. We admit that there is no sharp demarcation between teaching and research. It is, however, quite possible to estimate the time which the principal researcher should devote to his research project so that, in administrative terms at least, the inclusion of an amount

equivalent to the principal researcher's salary for that time should pose no difficulty.

We do share the concern for university autonomy. It is important to remember, however, that the Canada Council is not the only source of research funds in the humanities and social sciences and that most research contracts do include the salary of the principal researcher. The present policy of the Canada Council gives faculty members a financial incentive to undertake contract research or, if the university salary is reduced as a result of remuneration from such a contract, the Council policy gives the university a financial incentive to encourage contract research. In one way or the other, the present policy of the Canada Council means that mission-oriented research financed by research contracts has attractions which are not provided by a Council research grant.

We are convinced that the Council should include the salary of the principal researcher in its research grants. We are certain that in the long run this is necessary if curiosity-oriented research is to compete effectively with mission-oriented research at Canadian universities. We will be recommending later that this salary item, for research contracts and research grants, should be paid to the university which may, in turn, pay some or all of it to the researcher. Such an arrangement will strengthen the autonomy of the universities by providing them with additional income.

It has been argued that such a proposal would significantly increase the amount of each research grant, especially in the humanities and social sciences where the time of the principal researcher is relatively more important than the cost of equipment or the salaries of research assistants. The net result would be that the Canada Council with the same budget would give fewer awards. The same argument would apply to any inclusion of indirect research costs. Our discussion of this problem therefore is best left until after our discussion of indirect costs.

Direct research costs have provoked little controversy. These costs - travel costs, salaries of research assistants, purchase of equipment or computer time for the project - are easily accounted for and are normally covered by the research grant. In addition to these costs, there are overhead expenses which can be linked only indirectly to a specific research project but which help to

make the project possible. These costs include the capital costs for the building in which the research is conducted, heating and lighting and maintenance costs and the costs of the administrative services on which the principal researcher relies. As long as research was a minor or peripheral activity at universities, or was directly related to teaching, these indirect costs attracted little attention. With the expansion of university research, more human and material resources were absorbed by research, and this research required additional capital and administrative costs. To cite once again the 1969 report of the study group on federal research support, chaired by John B. Macdonald:

The Canadian tradition of grants-in-aid of research has raised major problems only recently. Until a few years ago the assisted research funds received by Canadian universities were usually a small fraction of the total ordinary expenditure of the universities - so small that in most cases the coverage of the corresponding salaries and indirect costs could usually be accommodated within the universities' general expenditure without distorting other programs. In the past four years the assisted research funds have grown much more rapidly than the universities' general revenues....The universities' own contributions here are no longer incidental items, and the Canadian tradition is less comfortable than it was.²⁸

University research has continued to expand in the years since the study group reported, until now it is euphemistic to talk of universities being less comfortable. We have reached the stage where research grants that make no allowance for indirect costs are seen as a financial burden to the university.

The debate over the payment of indirect costs has often focused on the difficulties of establishing what these costs are. There are deeper roots to the problem, however. Views on the nature of the university and on the relationship between teaching and research affect our attitudes. When it was assumed that a professor was primarily a teacher and that his research was a related but subordinate activity, indirect research costs were identified as instructional costs and hence a normal part of the university budget. Even the salary of the principal investigator was still seen as a teaching cost, which may explain why it has not been included in research grants. Research can no longer be seen only as a preparation for teaching or as a hobby. It may be directly related to teaching, but it can be a separate and distinct - and legitimate - activity in its own right. If we are to talk sensibly about the costs or benefits of research, we must have some reasonable estimate of research

expenditures, including direct costs, the salary of the principal researcher and indirect costs.

A reasonable estimate of indirect costs is the best one can hope for. The Macdonald Report of 1969 asserted that "the estimation of indirect costs which might reasonably be ascribed to the sponsored research grants of federal research councils is beyond the scope of present university cost studies or accounting procedures."²⁹ Since that time, there have been efforts in Canada and elsewhere to develop adequate accounting procedures, with little success. In a modern university there are activities which can be defined as teaching but which can also be defined as research. Directing the research of graduate students is an obvious example. As Stephen Peitchinis commented, in a study on university costs:

The research activity and graduate studies become inseparable from the teaching and service activities - organizationally and more importantly within the minds of the individuals involved. Nevertheless separation is essential to costing and necessary for the determination of the share any funding agency contributes to research and graduate studies. This does not imply that costing is not possible; rather that costing is based on judgment, often on the subjective judgment of the analyst and the individual researcher.³⁰

Some earlier formulas for establishing indirect costs seemed too subjective to win general acceptance. In 1965, for example, the Bladen Commission on university finances recommended that all federal research grants and fellowships "should carry with them a 30 per cent supplement as an unconditional grant to the university."³¹ This was an explicit recognition that research involved indirect costs to the university, but the recommendation was based on two unsubstantiated assumptions. The first was that the size of a research grant was a reasonably valid indicator of these indirect costs. These grants, it must be remembered, do not include any salary for the principal researcher although, especially for research in the humanities and social sciences, this is likely to be the major contribution of the university. Nor was there any attempt to show that 30 per cent of research grants or fellowships was a reasonable approximation of the universities' indirect costs. Four years later, the study group chaired by John B. Macdonald conceded the difficulty of estimating indirect costs but tried to give a "realistic but not accurate" estimate that these costs amounted to 35 per cent of the costs included in federal research grants.³² A more recent study prepared by the Ministry of State for

Science and Technology commented that "the use of a figure of 35 per cent of direct costs is of questionable validity, without any sound basis of factual data in regard to direct or indirect costs to universities."³³

Such caustic comments do not resolve the problem. It has become painfully clear to most university administrators that the indirect costs of research are a significant item in university budgets. At a time when these budgets are tight and when research contracts usually include at least some amount to meet these expenses, there is an obvious incentive to give preference to such contracts and to see Canada Council research grants (which include neither indirect costs nor salary for the principal researcher) as a regrettable burden. If an adequate allowance for these costs is not included, the trend toward mission-oriented research at Canadian universities will be even more marked.

The solution depends, first of all, on the recognition that universities must have some control over their expenditures and that they cannot commit themselves to unlimited research grants which impose indirect costs on universities. It is in the interests of the universities and the research councils to ensure that independent research can compete successfully with contract and mission-oriented research. This can be achieved if research grants in future include an amount approximating the salary of the principal researcher and indirect costs. The indirect costs cannot be established exactly because research and teaching costs can never be neatly separated. The closest approximation is likely to be a proportion of the direct costs of the project plus the salary of the principal researcher.³⁴

There is general agreement that university research contracts should include a sum to cover the salary of the principal researcher and the indirect costs of the project. The difficulty of establishing the exact amounts has not proved to be an insuperable problem; many contracts already include a sum agreed upon by the contractor and the university. There has been no such agreement for research grants, because the inclusion of these costs would sharply reduce the number of grants which the Canada Council could make. The Council and academics have been reluctant to adopt this policy without prior assurance that the federal government would increase the Council's budget at the same time, so that the Council could continue to support the same number of projects. Rather than reduce the number of grants, most academics have shown

a preference for the present system: the Council pays for direct costs and the university pays them for the time they spend on the research project and for the indirect costs.

This system will in the long run operate to the disadvantage of free research. University budgets are limited, and any research grant which covers only direct costs is a drain on the budget. Any new research project entails reducing expenditures elsewhere. This means that universities will have to restrict the number of these projects, or they will have to economize by increasing the average teaching load and by reducing the amount spent on services such as libraries or maintenance. Either the expansion of free research will be halted, or the time or facilities provided for this research will be more limited.

The inclusion of indirect costs and a salary for the principal researcher in future Canada Council grants will not in itself change the Council's financial contribution to research. If the Council's budget is not increased, it will reduce the number of projects which the Council can support. The competition will be stiffer for the grants the Council does make. The university, however, will have no budgetary reason to restrict the number of such grants held by its faculty members and no budgetary reason to give any preference to contract or mission-oriented research projects.

Another significant result of including salary and indirect costs in future research grants would be to give universities a larger role in planning and encouraging academic research at their institution. The amount of Canada Council research grants allocated to indirect costs and probably most of the amount allocated to salary for the principal researcher would go to the universities. Universities which in the past had to meet these costs out of their budget would have funds available to meet the special needs of the institution. In its modest way, this would reward universities with high research standards and encourage them to invest in library or other research facilities to maintain these standards. For those who are concerned about university autonomy, this would be a step in the right direction.

d. Support Programs

In addition to doctoral fellowships and research grants, the Canada Council has contributed to a wide range of programs designed to foster or support research in the humanities and social sciences in Canada. A brief survey of these programs will give a clearer impression of the contribution of the Canada Council to research in Canada and an idea of the wide range of activities which are intimately related to research.

A major program of the Council is leave fellowships. These fellowships, in contrast to research grants, are primarily payments to an individual professor to free him or her for research. A leave fellowship, however, is by no means the equivalent of an annual salary; in 1976-77 it was worth a maximum of \$10,000, plus up to \$1,500 for direct research and travel expenses. It is frequently associated with a sabbatical, so that the fellowship and the sabbatical salary paid by the university equal or approach the professor's regular salary.

The leave fellowship program is of special significance in the humanities and social sciences, where travelling to talk with other scholars or to study in libraries or archives is often essential, and where the writing usually requires a period of sustained, uninterrupted concentration. The value of this program is also suggested by the fact that over the years the humanities have always been awarded slightly more than half of these fellowships, even though the number of faculty in the social sciences is greater. Humanities professors have fewer opportunities for research contracts; the Canada Council's leave fellowship program helps to redress the balance. The Council has sharply increased its budget for this program, from \$300,000 in 1965-66 to \$1.3 million in 1970-71, to \$3.8 million in 1976-77. This rate of increase has more than kept pace with the growth in number of full-time faculty, especially in the 1970s, but it has not kept up with demand. In 1973-74, for example, there were 614 applications and 339 awards - a success rate of 55 per cent. In 1976-77, the applications had risen to 808, but the awards nevertheless numbered 378, for a success rate of 47 per cent. Even this was an improvement over 1975-76, when the success rate was 41 per cent.

The Canada Council also administers programs which may be seen as a contribution to the network of scholarly communications referred to in the previous chapter. Canadian scholars need the opportunity to travel to academic

conferences, and Canadian institutions in turn must organize and act as host to some of these conferences. These are difficult programs to administer. There is no objective test to establish the benefits to scholarship of attending such conferences, and so there is no easy way to decide what proportion of the Council's funds should be allocated to these programs. The Council has never allocated more than 3.5 per cent of its budget to travel and conferences; in 1975-76, this had declined to 2 per cent or a total of just over half a million dollars.

The aid to publication, in contrast, is a program which has grown in relative importance. No research project is completed until its results have been made available to other scholars, and publication is the major form of scholarly communication. Neither scholarly articles nor scholarly books command a vast reading audience, and limited sales combined with spiralling editorial and printing costs have threatened the survival of established academic journals and inhibited the publication of scholarly books. The publication program of the Canada Council has aided established journals, encouraged the emergence of new journals, and subsidized the publication of a wide range of major monographs and books. The cost of the program rose from \$138,000 in 1965-66 to \$500,000 in 1970-71, to \$1.9 million by 1976-77. Even this increase may not have been enough to balance the increases in faculty numbers and publication costs. The publications program is now being seriously questioned, not because there are any doubts about the need for the results of scholarly research to be communicated, but because the traditional forms of publication are so slow and costly.

The Canada Council is also supporting research in the humanities and social sciences by other means. For some years it provided grants to university libraries for the acquisition or strengthening of special collections. Even \$1 or \$2 million per year had little impact on total library acquisitions in Canada. There was also the impression that universities, affected by budgetary constraints, were inclined to reduce their library allocations for libraries which had a Council grant. The program was dropped when the Canada Council experienced severe budgetary constraints. The Council is still prepared to give some financial assistance for the acquisition of unique collections, but no grants have been made under this program in recent years.

The Canada Council also offered a few postdoctoral fellowships for some years. These fellowships are well-established in the natural sciences where, it is argued, the productive years are the early years of a scientific career; freeing promising young scholars from teaching responsibilities gives them an opportunity to make original contributions to knowledge. It is not surprising that humanists and social scientists should advocate postdoctoral fellowships in their disciplines, especially at a time when so few university appointments are available.³⁵ There is no evidence, however, that this immediate postdoctoral period is the period of original creativity in the humanities or social sciences. In practice, the PhD graduates who are offered university posts usually accept the offer. The postdoctoral fellowships are most likely to go to candidates without a university appointment and who see the fellowship as a means of improving their qualifications as candidates for future appointments. The Canada Council terminated this program in 1975.

The Canada Council has also experimented with fellowships at the MA level. In its early years, when graduate studies in the humanities and social sciences in Canada were still emerging, it offered both MA and PhD fellowships. The MA program, however, remained small and in the mid-60s, when some provinces had established MA fellowship programs, the program was terminated. By 1972, however, there was growing concern that many outstanding students seemed to have decided against graduate studies because the prospects of a university career were not encouraging and had opted for a job or professional training. The MA scholarship program was designed to encourage the best of these students to continue their academic studies. The difficulty has been to identify those students who have the academic qualifications and a commitment to an academic career. In 1975-76 the amount allocated to the program amounted to \$650,000, although the total number of MA scholarships was unchanged from the previous year.

e. Regional Impact

Receiving most of its funds from the federal government, the Canada Council cannot ignore the regional or cultural implications of its programs and, within its various programs, has opted for a limited role. It does not directly solicit applications from individuals or groups; nor does it establish quotas

for discipline or other categories. Eligibility is determined by the details of the program, but within these limits the initiative must come from the applicants, and the successful candidates are selected on the basis of academic merit by academic juries or appraisers. The Council, however, has recognized that these procedures might favor one region or one group, and from time to time it has monitored the regional distribution of its awards and the distribution among disciplines. If there had been major discrepancies, it can be assumed the Council would have modified its procedures to compensate the less favored region or discipline.

The Council has never deemed it necessary to provide this compensation. There have been differences between regions and disciplines in the past, but in the judgment of the Council these have never been serious enough to justify modification of existing procedures. A study prepared in 1969 did suggest that Ontario was receiving a disproportionate share of Council funds: in 1966-67 over half the doctoral fellowships and 45 per cent of the research grants went to Ontario. To a large extent this could be explained by the high proportion of doctoral students enrolled in Ontario universities and by the number of faculty in Ontario; the success rate of the Ontario applicants for research grants in that year was higher than for any other region, but the success rate of applicants for doctoral fellowships from Ontario was actually below the national average. Seven years later, in 1973-74, the discrepancy had virtually disappeared. Over half the doctoral fellowships were still awarded to students at Ontario universities, but the success rate there was lower than for any other region. The percentage of research awards going to Ontario declined slightly to 43 per cent, but the success rate was only a few decimal points above the national average. For both programs it could be said that the system of awards by academic juries or by academic appraisers did not show any significant regional bias.

5. The Funding of Research by Universities

No discussion of the funding of research in Canada would be complete without a discussion of allocation of funds by universities. Canadian universities are financed mainly by public funds, with some additional money coming from student fees and a relatively small amount from endowments, donations and contracts.

Table 1

Number of Awards and Success Rates for Canada Council Doctoral Fellowships
and Research Grants in 1966-67 and 1973-74, by Region

Region	Doctoral Fellowships				Research Grants			
	1966-67		1973-74		1966-67		1973-74	
	Number (1)	Success Rate	Number (2)	Success Rate	Number (3)	Success Rate	Number (2)	Success Rate
Atlantic	0	0	23	45	13	54	54	74
Quebec	32	31	200	51	72	69	164	74
Anglophone Universities	(10)	(27)	(73)	(43)	(26)	(74)	(54)	(82)
Francophone Universities	(22)	(34)	(127)	(56)	(44)	(66)	(110)	(73)
Ontario	72	34	518	43	159	76	336	75
Western	23	38	203	52	85	65	174	74
<u>Canada</u>	<u>127</u>	<u>37</u>	<u>944</u>	<u>47</u>	<u>350</u>	<u>66</u>	<u>775</u>	<u>74</u>

$$\text{Success rate} = \frac{\text{number of awards}}{\text{number of applications}} \times 100$$

1. Based on data prepared by the Research and Analysis Section of the Canada Council, June 1967.
2. Based on data prepared by the Research and Analysis Section of the Canada Council, May 1974.
3. Based on data appearing in The Canada Council Program of Research Grants: An Analysis for 1965-66 to 1968-69, prepared by W.P. Hettich. The Canada Council: Ottawa, 1969, Table 2.1.

Each university, however, has considerable leeway in determining how these funds should be spent. It may allocate some money specifically for research. Other funds which are considered part of the instructional budget may support research activities, because these activities are inseparable from teaching. Statistics on the universities' financial contribution to research are almost nonexistent. We can do no better than arrive at approximate estimates of the amount of money involved and the proportion which is allocated to the humanities and social sciences.

The total operating revenue of Canadian universities in 1971-72 was \$1.2 billion. Of this amount, just over \$1 billion, or 77 per cent, came from government sources. The largest single item was the sum of the various provincial grants which, in most cases, were based on a formula linked to enrolment. Under the Fiscal Arrangements Act of 1967, however, the federal government agreed to reimburse the provincial governments for one-half of their expenditures on postsecondary education. This agreement was extended to 1977, although since 1972 the total increase in the federal share for any single year has been limited to 15 per cent of the preceding year. There is no need to go into the details of the agreement.

Beginning in March 1977, the Fiscal Arrangements Act was replaced by an agreement called Established Programs Financing. Under the Fiscal Arrangements Act the federal government had no direct control over the programs and curricula of the individual universities. It gave general encouragement to provincial governments to invest in postsecondary education by defraying half the costs, although even this was modified in 1972 by the federal limit on expansion to 15 per cent per annum. Under the new Established Programs Financing, almost all direct federal influence on university financing is eliminated. Taking 1976-77 as the base year, the federal government has agreed to provide approximately half of its postsecondary fiscal transfer by transferring additional income tax points and the other half by a per capita grant which will increase with any increase in the Gross National Product. Federal funds, in other words, will no longer be tied to the level of provincial payments to universities. In the words of the Prime Minister, "...in mature schemes like hospital insurance, postsecondary education and medicare, we are in a sense gambling that the provinces will want to continue to be deeply involved and that they will not go

back on the high standards of service which have been established over the past decade and a half in Canada in those three areas."³⁶ For the next five years - the term of this agreement - the federal government will not be sharing university costs directly and will not be providing financial incentives to expand or even to maintain the existing level of university services.

The provincial control over university incomes extends beyond provincial grants. Student fees, which produced just under 12 per cent of university revenues in 1975-76, are also sensitive to provincial pressures. In most provinces, government policy is to minimize the financial barriers to higher education, and this has meant keeping fees low. Fees were eliminated entirely in Newfoundland; other provinces, such as Ontario, have effectively determined fee structures by linking fees with provincial grants in determining university revenues. The proportion of university income attributable to student fees has steadily declined over the last decade.

There are many constraints on university administrators. Student preferences affect the courses offered and the planning of programs. Faculty and support staff salaries are influenced by salary contracts at other universities or by wages offered by alternative employers. A certain level of library acquisitions is required to maintain academic respectability. Provincial governments are increasingly regulating the establishment of new professional schools or new PhD programs. Within these limits - which also exist in other enterprises, public and private - the universities do make significant decisions about the allocation of their funds. These decisions determine, among other things, how much of the university budget is to be spent on research.

Most universities now allocate specific amounts for research. This money is usually distributed to meet the direct research costs of faculty members - travel, typing, research assistants - and a preference may be given to younger professors or for the initial or final stages of a project. The university is the appropriate level for administering these small grants, and the need for such support seems beyond question. At most universities, the amount directly allocated to research is so limited as to be almost negligible. If this constituted the universities' major contribution to research it would be a dismal record.

The major contribution of universities to research is indirect. Libraries

and laboratories and support staff make research possible. A professor's salary is a contribution to research, if the professor devotes part of his time to research. Much of the research performed in Canada, it will be remembered, is performed at Canadian universities, which constitutes their major investment in research.

This does not mean that universities can accurately measure the amount spent on research. For example, a decision on the average number of classroom hours for a professor will affect the amount of his research. Who can determine, however, how much of his time outside the classroom is used to prepare his course and how much can be attributed to research? It is possible to estimate the cost to the university of reducing the average teaching load by one hour, but it is not possible to claim such a cost as an investment in research. Decisions affecting faculty workloads and salaries and decisions on capital construction, library acquisitions and support staff will all have some impact on research. Until the amount of research can be measured, or until we can agree on some arbitrary distinction between research and teaching, we cannot measure the university investment in research.

Statistics Canada has attempted to estimate university expenditures on research and development. The margin of error may be considerable, but the figures are some indication of the scope of university-funded research in Canada. In 1970, for example, out of a total of just over \$1 billion spent on research and development, \$185 million or 17.7 per cent came from university budgets. By 1974, the total spent on research had risen to \$1.5 billion, and the university contribution had risen to \$284 million, or 18.7 per cent.³⁷ If we are to rely on these figures, one dollar out of every six spent on research and development in Canada came out of Canadian university budgets.

The assumptions on which these estimates were based are revealing, because they explain how these totals were reached and illustrate how difficult it is to isolate research from other university activities. Statistics Canada began by estimating the direct payments to universities from federal and provincial governments and from private sources for research and development, to arrive at the "total direct costs of sponsored research." It then resolved the debate over indirect costs by accepting the United States National Science Foundation (NSF) estimate that indirect costs amounted to 41 per cent of the direct costs

of sponsored research. The estimate of the cost of nonsponsored research also involved some sweeping assumptions. Statistics Canada had to rely on the universities' estimates of their expenditures on "instructional and nonsponsored research," and then, again relying on National Science Foundation estimates, assumed that 16 per cent of these expenditures could be classified as the total direct and indirect costs of nonsponsored research. The estimated total expenditure on research and development at Canadian universities then became the sum of these estimated costs of sponsored and nonsponsored research.

It is not a criticism of Statistics Canada to say that many of the assumptions and estimates on which these final figures are based are arbitrary. Not everybody would agree, for example, that the NSF percentages are realistic for Canada. All estimates will appear arbitrary until precedents are accepted or there is a consensus on what percentages are to be used. It is not the fault of Statistics Canada that there is no clear distinction between research and teaching at universities.

Even if we could agree on the total university expenditures on research, we would still want to know how the money is divided between faculties and disciplines. Do universities, like governments, spend the largest portion of their research funds in the natural and life sciences rather than in the humanities and social sciences? To the extent that the universities absorb the indirect costs of research contracts and research grants, their contribution to the natural and life sciences will be significantly larger because the bulk of the contracts and grants are in these areas. What of research that is not externally sponsored and is financed entirely out of the universities' budgets? Do universities act as a balance wheel and compensate for the lack of outside sponsors for research in the humanities and social sciences?

The evidence is inconclusive. We have seen no formal statements of university research policy in which this countervailing approach is stated. At the same time, however, faculty members are usually expected to apply to external sponsors and to rely on university funds only as a last resort. The greater availability of external research funds in the natural sciences may mean there are at least more applicants from the humanities and social sciences for university support.

A study conducted by this Commission lends some support to this hypothesis.

Some Ontario universities provided data on the sources of research grants and the disciplines to which these grants were awarded for 1973-74. Almost 90 per cent of the research grants from government sources went to the natural and medical sciences; 9.7 per cent went to the social sciences and 0.9 per cent to the humanities. Research grants from business and other private sources showed even more preference for the natural and medical sciences: 92.8 per cent compared to 6.9 per cent for the social sciences and 0.1 per cent for the humanities. In contrast to these distributions, the universities allocated 78.6 per cent of their research funds to the natural and medical sciences, 14.2 per cent to the social sciences and 6.3 per cent to the humanities. The lion's share still goes to the sciences, but at least a larger proportion of university research grants goes to the social sciences and humanities than of the grants awarded by governments or business.³⁸

These statistics also show the special importance of university research grants for the humanities. The proportion of government and private research grants going to the humanities, on the basis of this Ontario study, is less than 1 per cent, compared with 6.3 per cent for university grants. If we take only the total grants to the humanities and social sciences, less than 10 per cent of this portion of the government and private research grants went to the humanities, while for the university grants almost 30 per cent went to the humanities. Only the Canada Council, which has allocated over 40 per cent of its research grants to this area, shows a greater bias in favor of the humanities.³⁹

In conclusion, it should be remembered that the data we have on the funding of research by Canadian universities is sketchy and incomplete. Without question, these universities contribute significantly to research. There are the direct research grants to faculty members, which we have been discussing. Probably much more important is the contribution through faculty salaries. These salaries, which constitute a large proportion of the total university budget, cover the time the faculty member devotes to research as well as to teaching. If "about a third of the ordinary working hours of a professor must be devoted to research or the equivalent form of scholarship, if he is to be a good teacher," as one Commission contended, this university investment in research amounts to a considerable sum.⁴⁰ Salaries paid during sabbatical years are a special example

of this aid to research. Universities also meet the indirect costs of unsponsored faculty research as well as much of sponsored faculty research. It is not possible to produce accurate figures, but the university contribution to research is certainly important. The university contribution to research in the social sciences and, even more, in the humanities is especially significant because universities allocate a larger portion of their research funds to the humanities and social sciences than do governments or private sponsors.

This characteristic of university research funding acquires a special significance in the light of some recent trends. We have already remarked on the tendency of governments to increase their control over the subject matter and orientation of university research for which they pay directly. At the same time there are strong financial incentives for universities to favor contract research, because contracts are more likely to cover faculty salaries and indirect costs. These trends threaten to limit the funds which universities will be able to allocate to free research in the future. Any reduction in university research funds will weigh most heavily on research in the humanities and, to a lesser extent, in the social sciences.

6. The Financial Contribution of Faculty and Students to University Research

Faculty members and graduate students do not normally contribute directly to the costs of university research. In some circumstances, they contribute indirectly by foregoing potential income in order to do their research. This is an economic cost not easily calculated but nonetheless real.

Professors forego income if they opt for research which brings no increment in salary, instead of conducting research under a contract in which the researcher is paid for the time devoted to the project. In some disciplines, such as English, the opportunity for research contracts or consultants' fees is rare, and so the loss of income is hypothetical. For economists or sociologists, however, the choice may be quite explicit. This loss of potential income may not be significant; a researcher may find adequate compensation in being able to define his own research project or in the status which independent research may bring to him among his colleagues. However, this indirect cost is not associated with contract research. As long as this distinction between free and contract research continues, prospective faculty members will have a financial

incentive to opt for those disciplines where contracts for research and fees for consultants are more common, and researchers will have a financial incentive to opt for contract rather than independent research.

The indirect financial contribution of the graduate student is a special case. Many students are employed part-time as research assistants, working on the research project of a member of the faculty. This research may be a rewarding experience for the student, but it is probable he will be paid less than a nonstudent would be paid to do the same work. The difference may be seen as a payment by the student for the training he is receiving as a graduate student. In some cases, however, the training benefits may be minimal, and thus the difference is an involuntary contribution by the student to the cost of the research project.

7. Conclusion

In our introduction to this chapter on the financing of university research we stressed the complexity of the present pattern. Research funds come from a variety of sources - government departments and agencies, private enterprise, universities, faculty and students. These funds may be earmarked, directly or indirectly, for research in the natural sciences, the medical sciences, the social sciences or the humanities. They may be intended for research within a government department or agency, research by private enterprise or research at a Canadian university. The payments may be in the form of a contract, a grant or a fellowship and may or may not include indirect costs and the salary of the principal researcher. The present level of research funding is the unstable result of decisions made in different institutions for often unrelated reasons.

There are many advantages to this system. The diversity of funding agencies means a wider range of research opportunities; researchers in the humanities, for example, would probably have almost no research support if the Canada Council and the universities did not have research funds. At the same time, individual agencies can stimulate research in an area of special interest to them by offering incentives in the form of research facilities or research contracts. The system may be complex and confusing, but it has shown a remarkable capacity to expand as the demand for research has developed and to contribute to human knowledge and to the application of this knowledge.

The system, however, has obvious disadvantages. There is no single planning agency and no agency to coordinate the various funding and research institutions. There is, therefore, the likelihood of repetition and duplication, of the wasteful investment in or neglect of researchers and research facilities. In part this can be seen as the necessary cost of a flexible and potentially innovative system. A more integrated and coordinated system might be less efficient in the long run, because it might provide fewer opportunities for the unorthodox and the eccentric.

We will not be proposing any dramatic changes in the existing system of financing university research in Canada. We have already drawn attention to some trends which we find disturbing. We believe, for example, that governments are tending to exercise more control over university research which they pay for directly, to ensure that the research is related more or less directly to the social problems in which they are interested. This is of special concern in the humanities and social sciences, because many disciplines seem to have no immediate relevance to these problems and because the emphasis on applied research tends to deflect attention from the interest in social values and social criticism which is an aspect of research in the humanities and social sciences. The Canada Council, and now the Social Sciences and Humanities Research Council, are committed to the broader interests of research and scholarship in this area, but the relative decline in the Council's budget compared to other federal agencies which fund research in the social sciences and humanities is one indication of the shift in federal funding toward oriented research.

The universities have also shown a special concern for research in the human sciences. Again, recent trends are disturbing. University budgets are being severely restricted. As a consequence, universities are finding it more difficult to pay the indirect costs of research projects and prefer research contracts and grants which reimburse them for these costs. The net result is a handicap for much of the research in the human sciences, where such contracts are unusual.

The broad outlines of the present system of financing university research may not require any drastic modifications, but within this system some changes are needed if research in the human sciences is to be adequately supported in the future.

TABLE VI, 1
TOTAL FEDERAL GOVERNMENT EXPENDITURES ON R&D IN THE HUMAN AND NATURAL SCIENCES,
BY PERFORMER, 1970-71 TO 1976-77 (\$'000)*

Field	Performer	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77
S C H I U E M N A C N E S	Government:							
	Federal	22,009	27,751	33,528	38,977	43,517	51,623	55,706
	Prov. & Municipal	782	868	424	1,554	2,891	4,553	4,433
	Cdn. Universities	9,760	11,514	12,663	14,992	18,049	21,180	24,990
	Cdn. Non-Profit ORGS	7,940	8,134	7,083	4,370	5,188	7,940	5,201
	Business Enterprises	2,295	1,819	2,277	3,538	4,504	7,488	9,440
	Other Cdn. Performers	0	0	0	2,495	2,943	4,371	4,473
	Foreign	45	1,156	4,870	9,618	11,274	20,786	18,492
	Total	42,831	51,242	60,845	75,544	88,366	117,941	122,735
	Government:							
S N C A I T E U N R C A E L S	Federal	319,659	343,706	366,050	401,162	444,802	498,560	541,505
	Prov. & Municipal	0	0	0	916	3,832	1,803	3,219
	Cdn. Universities	113,703	120,032	122,246	127,810	132,795	143,780	149,238
	Cdn. Non-Profit ORGS	5,538	5,560	3,827	3,111	3,406	4,429	7,220
	Business Enterprises	143,868	141,511	146,340	172,859	164,008	172,971	186,031
	Other Cdn. Performers	1,526	1,725	2,940	4,269	3,282	4,587	3,942
	Foreign	4,146	5,875	8,927	11,007	18,833	26,342	31,294
	Total	588,440	618,409	650,330	721,134	770,958	852,472	922,449
	Government:							
	Federal	341,668	371,457	399,578	440,139	488,319	550,183	597,211
T O T A L	Prov. & Municipal	782	868	424	2,470	6,723	6,356	7,652
	Cdn. Universities	123,463	131,546	134,909	142,802	150,844	164,960	174,228
	Cdn. Non-Profit ORGS	13,478	13,694	10,910	7,481	8,594	12,369	12,421
	Business Enterprises	146,163	143,330	148,617	176,397	168,512	180,459	195,471
	Other Cdn. Performers	1,526	1,725	2,940	6,764	6,225	8,958	8,415
	Foreign	4,191	7,031	13,797	20,625	30,107	47,128	49,786
	Total	631,271	669,651	711,175	796,678	859,324	970,413	1,045,184

SOURCE: Statistics Canada, unpublished data.

* Administration of extramural programs is included in the data prior to 1971-72.

TABLE VI. 2

FEDERAL GOVERNMENT EXPENDITURES FOR SCIENTIFIC ACTIVITIES IN THE
HUMAN AND NATURAL SCIENCES, BY ACTIVITY, 1970-71 TO 1976-77 (\$'000)

Field	Scientific Activity	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77
S H U I M L A N C E S	R & D:							
	Current Expend.	42,831	51,242	60,585	75,544	88,366	117,941	122,735
	Capital Expend.	42,334	49,385	59,377	73,875	86,440	115,784	119,930
	Related Sci. Activities:	497	1,857	1,468	1,669	1,926	2,157	2,805
	Current Expend.	97,614	133,432	145,195	168,977	210,391	238,952	310,925
	of which Education Support	93,585	131,429	144,225	167,493	205,515	237,720	310,013
	Capital Expend.	14,133	13,211	12,628	15,047	18,367	18,421	22,848
	SUB-TOTAL: Current Expend.	4,029	2,003	970	1,484	4,876	1,232	912
	SUB-TOTAL: Capital Expend.	135,919	180,814	203,602	241,368	291,955	353,504	429,943
	TOTAL	140,445	184,674	206,040	244,521	298,757	356,893	433,660
N S A C T I V I T I E S	R & D:							
	Current Expend.	588,440	618,409	650,330	721,134	770,958	852,472	922,449
	Capital Expend.	547,468	573,229	607,075	675,999	722,228	782,757	858,500
	Related Sci. Activities:	40,972	45,180	43,225	45,135	48,730	69,715	63,949
	Current Expend.	186,766	218,936	250,590	238,155	282,692	316,856	368,119
	of which Education Support	176,054	202,195	231,384	219,176	261,348	290,051	340,412
	Capital Expend.	10,032	9,921	9,887	10,858	11,333	13,659	14,607
	SUB-TOTAL: Current Expend.	10,712	16,741	19,206	18,979	21,344	26,805	27,707
	SUB-TOTAL: Capital Expend.	723,522	775,424	838,459	895,175	983,576	1,072,808	1,198,912
	TOTAL	51,684	61,921	62,431	64,114	70,074	96,520	91,656
T O T A L	R & D:							
	Current Expend.	631,271	669,651	710,915	796,678	859,324	970,413	1,045,184
	Capital Expend.	589,802	622,614	666,452	749,874	808,668	898,541	978,430
	Related Sci. Activities:	41,469	47,037	44,693	46,804	50,656	71,872	66,754
	Current Expend.	284,380	352,368	395,785	407,132	493,083	555,808	679,044
	of which Education Support	269,639	333,624	375,609	386,669	466,863	527,771	650,425
	Capital Expend.	24,165	23,132	22,515	25,905	29,700	32,080	37,455
	SUB-TOTAL: Current Expend.	14,741	18,744	20,176	20,463	26,220	28,037	28,619
	SUB-TOTAL: Capital Expend.	859,441	956,238	1,042,061	1,136,543	1,275,531	1,426,312	1,628,855
	TOTAL	56,210	65,781	64,869	67,267	76,876	99,909	95,373
		915,651	1,022,019	1,106,960	1,203,810	1,352,407	1,526,221	1,724,228

SOURCE: Statistics Canada, unpublished data.

TABLE VI, 3

FEDERAL GOVERNMENT CURRENT EXPENDITURES ON SCIENTIFIC ACTIVITIES IN THE
HUMAN SCIENCES, BY DEPARTMENT (SELECTED) 1970-71 TO 1976-77

Field	Department or Agency	1970-71		1971-72		1972-73		1973-74		1974-75		1975-76		1976-77	
		\$'000	Rank	\$'000	Rank	\$'000	Rank	\$'000	Rank	\$'000	Rank	\$'000	Rank	\$'000	Rank
S	Statistics Canada	49,029	1	79,697	1	65,572	1	78,830	1	99,832	1	116,860	1	174,106	1
H C	Canada Council	20,108	2	20,048	2	20,837	2	22,851	2	25,091	2	28,768	2	32,443	2
U I	Health & Welfare	3,939	6	7,227	4	9,037	3	13,495	3	18,472	3	21,799	3	24,800	3
N E	I.D.R.C. (1)	400	*	2,013	*	5,147	8	9,298	4	13,564	4	20,554	4	20,384	4
A N	C.I.D.A. (2)	0	-	1,385	*	4,148	9	7,804	6	8,412	9	13,703	5	15,111	5
N C	SUB-TOTAL: Above 5 Depts.	73,476		110,370		104,741		132,278		165,371		201,684		266,844	
E	TOTAL	135,919		180,814		203,602		241,368		291,955		353,504		429,943	
S															
N S	Environment	127,145	2	144,490	1	157,947	1	178,203	1	208,419	1	225,833	1	260,890	1
A C	National Research Council	127,484	1	131,837	2	141,206	2	148,334	2	182,881	2	191,775	2	228,454	2
T I	Atomic Energy	95,400	3	78,244	5	81,146	5	88,376	4	101,215	3	104,052	3	111,802	3
U E	Agriculture	59,845	7	61,474	7	69,064	6	75,033	5	85,321	5	96,606	4	108,938	4
R N	Energy, Mines & Resources	60,405	6	61,514	6	66,849	7	71,388	6	76,800	6	86,380	6	103,078	5
A C	SUB-TOTAL: Above 5 Depts.	470,279		478,559		516,212		561,334		634,636		704,646		813,162	
L E	TOTAL	723,522		775,424		838,459		895,175		983,576		1,072,808		1,198,912	
S															

SOURCE: Statistics Canada, unpublished data.

* Lower than 10.

(1) International Development Research Centre

(2) Canadian International Development Agency

TABLE VI, 4

FEDERAL GOVERNMENT PAYMENTS TO CANADIAN UNIVERSITIES FOR SCIENTIFIC ACTIVITIES IN THE
HUMAN & NATURAL SCIENCES, BY DEPARTMENT (SELECTED), 1970-71 TO 1976-77

Field	Department or Agency	1970-71		1971-72		1972-73		1973-74		1974-75		1975-76		1976-77	
		\$'000	Rank	\$'000	Rank	\$'000	Rank	\$'000	Rank	\$'000	Rank	\$'000	Rank	\$'000	Rank
S H C U I M E A N N C E S	Canada Council	13,654	1	13,819	1	15,003	1	16,712	1	18,852	1	22,506	1	25,451	1
	National Health & Welfare	1,548	2	2,654	2	2,837	2	5,269	2	5,911	2	5,556	2	6,715	2
	Canadian Internat'l Devel. Agency	0	-	200	7	610	6	1,240	4	1,369	4	2,277	3	2,585	3
	Secretary of State	78	*	768	3	1,319	3	1,545	3	1,819	3	1,966	4	1,743	4
	Urban Affairs	0	-	36	*	734	5	882	5	548	6	774	7	1,325	5
	SUB-TOTAL: Above 5 Depts.	15,280		17,477		20,503		25,648		28,499		33,079		37,819	
	TOTAL	19,164		21,396		23,935		28,278		32,839		38,125		43,588	
N S A C T I U E K N A C U E S	National Research Council	61,675	1	64,449	1	63,766	1	65,579	1	66,211	1	75,748	1	88,524	1
	Medical Research Council	29,950	2	31,416	2	35,262	2	38,179	2	40,417	2	45,079	2	46,338	2
	Health & Welfare	11,191	3	11,200	4	12,904	3	13,728	3	10,533	3	10,984	3	11,111	3
	Environment	2,778	7	2,787	6	2,681	6	3,367	5	3,748	5	3,314	5	3,901	4
	Agriculture	782	8	782	7	799	10	788	9	1,081	9	1,574	7	2,677	5
	SUB-TOTAL: Above 5 Depts.	106,375		135,723		115,412		121,641		121,990		136,699		152,551	
	TOTAL	123,245		130,011		132,205		138,192		142,834		156,441		162,875	

SOURCE: Statistics Canada, unpublished data.

* lower than 10.

Occupational distribution of male doctoral
degree holders according to human sciences
discipline of study, Canada, 1973 *

Discipline (selected)	% of male PhDs per discipline who are univer- sity teachers (* indicates this is the largest occupation)		Next largest or largest occupation per discipline type of occupation . (* indicates this is the largest occupation)	% of total
Classics	72.0	*	Administrators in teaching	1.2
English	87.0	*	Administrators in teaching	4.6
French	69.4	*	Administrators in teaching	12.9
Other modern languages	76.4	*	Writers and Editors	5.5
History	77.0	*	Administrators in teaching	4.8
Linguistics	80.1	*	Administrators in teaching (6)	4.8
Philosophy	60.4	*	Administrators in teaching	9.0
Religious studies	28.8		Ministers of religion	* 39.1
Sub-total :				
Humanities	61.2			15.6
Sub-total(excluding religious studies)	73.0			7.0
Anthropology	75.0	*	Anthropologists	4.2
Business Adminis.(1)	63.6	*	Industrial engineers	9.1
Economics (2)	58.0	*	Economists	13.6
Geography	80.8	*	Geographers	5.8
Law	30.9		Lawyers	* 32.7
Political Science (3)	72.9	*	Administrators in teaching (7)	5.7
Psychology (4)	66.0	*	Psychologists	12.8
Sociology (5)	83.3	*	General managers	2.6
Sub-total :Social Sc.	65.2			11.6
TOTAL	72.0			15.7
TOTAL (excluding religious studies)	80.6			11.1

* Occupation or job of longest duration in the last twelve months; degree is last highest earned degree.

(1) Excludes accounting

(2) Excludes agricultural economics

(3) Excludes public administration

(4) Excludes clinical and educational

(5) Includes demography but excludes criminology

(6) Tied with translators

(7) Tied with government administrators

SOURCE : Statistics Canada, in conjunction with Ministry of State for Science and Technology,
Post-Censal Highly Qualified Manpower Survey, 1973, Table 17.

TABLE VI, 6

COMPARISON OF ARTS & HUMAN SCIENCES GRANT BUDGETS OF THE
CANADA COUNCIL 1958-59 TO 1976-77

Year	Amounts \$'000			Total (C)	B as % of (C)	Indexes		
	Arts (A)	Human Sciences (B)				Arts	Human Sciences	Total
1951-52	749	668		1,417	47.1	100.0	100.0	100.0
1958-59	1,435	1,231		2,666	46.2	191.6	184.3	188.1
1959-60	1,263	1,249		2,512	49.7	168.6	186.7	177.3
1960-61	1,397	1,105		2,502	44.2	186.5	165.4	176.6
1961-62	1,406	1,061		2,467	43.0	187.7	158.8	174.1
1962-63	1,478	1,207		2,685	45.0	197.3	180.7	189.5
1963-64	1,424	1,212		2,636	46.0	190.1	181.4	186.0
1964-65	1,475	1,327		2,802	47.4	196.9	198.7	197.7
1965-66	3,374	2,840		6,214	45.7	450.5	425.1	438.5
1966-67	4,297	5,554		9,851	56.4	573.7	831.4	695.2
1967-68	7,039	11,208		18,247	61.4	939.8	1677.8	1287.7
1968-69	8,689	15,613		24,302	64.2	1160.1	2337.3	1715.0
1969-70	9,412	17,126		26,538	64.5	1256.6	2563.8	1872.8
1970-71	10,269	18,238		28,507	64.0	1371.0	2730.2	2011.8
1971-72	12,069	18,442		30,511	60.4	1611.3	2760.8	2153.2
1972-73	15,239	19,197		34,436	55.7	2034.6	2873.8	2430.2
1973-74	18,486	20,819		39,305	53.0	2428.0	3116.6	2773.8
1974-75	21,898	22,338		44,236	50.5	2923.6	3344.0	3121.8
1975-76	30,446	25,289		55,735	45.4	4064.9	3785.8	3933.3
1976-77	32,558	27,811		60,349	46.1	4346.9	4163.3	4258.9

\$ million

SOURCE: Canada Council excludes administration	Canada Council Hum. & Soc. Sci.* Arts*	1970-71	1976-77	Annual Compound Δ%
		18.2	27.8	7.3
		10.3	32.6	21.2
		98.8	143.7	6.4
		140.0	433.0	20.2

* excludes administration

Δ% : percentage change

TABLE VI, 7

PROVINCIAL (SELECTED) AND FEDERAL EXPENDITURES ON SCIENTIFIC ACTIVITIES
IN THE HUMAN SCIENCES, BY ACTIVITY, 1974-75

Scientific Activity	Provincial Government				Federal Government	
	Nova Scotia	Ontario	Saskatchewan	Alberta	Sub-total	Federal Government
R & D:						
Current Expend.	1,090	11,252	544	3,039	15,925	88,366
Capital Expend.	1,089	11,200	544	3,038	15,871	86,440
Related Sci. Activities:	1	52	0	1	54	1,926
Current Expend.	2,288	19,740	6,495	8,170	36,693	210,391
Capital Expend.	2,287	19,740	6,488	8,142	36,657	205,515
of which Education Support	48	2,439	492	24	3,003	18,367
Capital Expend.	1	0	7	28	36	4,876
Sub-total: Current Expend.	3,376	30,940	7,032	11,180	52,528	291,955
Sub-total: Capital Expend.	2	52	7	29	90	6,802
Total	3,378	30,992	7,039	11,209	52,618	298,757
R & D:						
Current Expend.	32.3	36.3	7.7	27.1	30.3	29.6
Capital Expend.	32.2	36.1	7.7	27.1	30.2	28.9
Related Sci. Activities:	0.0	0.2	0.0	0.0	1.0	0.6
Current Expend.	67.7	63.7	92.3	72.7	69.7	70.4
Capital Expend.	67.7	63.7	92.2	72.6	69.7	68.8
of which Education Support	1.4	7.9	7.0	0.2	5.7	6.1
Capital Expend.	0.0	0.0	0.1	0.2	0.1	1.6
Sub-total: Current Expend.	99.9	99.8	99.9	99.7	99.8	97.7
Sub-total: Capital Expend.	0.1	0.2	0.1	0.3	0.2	2.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: Statistics Canada

TABLE VI, 7A

PROVINCIAL (SELECTED) & FEDERAL EXPENDITURES ON SCIENTIFIC ACTIVITIES
IN THE NATURAL SCIENCES, BY ACTIVITY, 1974-75

Scientific Activity	Provincial Government				Federal Government
	Nova Scotia	Ontario	Saskatchewan	Alberta	
R & D:					
Current Expend.	676	40,234	2,962	6,124	770,958
Capital Expend.	676	38,017	2,625	6,110	722,228
Related Sci. Activities:	0	2,217	337	14	48,730
Current Expend.	3,420	11,271	5,334	6,311	282,692
of which Education Support	3,208	10,778	5,298	5,951	261,34
Capital Expend.	0	4	354	120	11,333
Sub-total: Current Expend.	212	493	36	360	21,344
Sub-total: Capital Expend.	3,884	48,795	7,923	12,061	983,576
Total	212	2,710	373	374	70,074
	4,096	51,505	8,296	12,435	1,053,650
R & D:					
Current Expend.	16.5	78.1	35.7	49.2	73.2
Capital Expend.	16.5	73.8	31.6	49.1	68.5
Related Sci. Activities:	0.0	4.3	4.1	0.1	4.6
Current Expend.	83.5	21.9	64.3	50.8	26.8
of which Education Support	78.3	20.9	63.9	47.9	24.8
Capital Expend.	0.0	0.0	4.3	1.0	1.1
Sub-total: Current Expend.	5.2	1.0	0.4	2.9	2.0
Sub-total: Capital Expend.	94.8	94.7	95.5	97.0	93.3
Total	5.2	5.3	4.5	3.0	6.7
	100.0	100.0	100.0	100.0	100.0

SOURCE: Statistics Canada

TABLE VI, 8
RESEARCH FUNDS, U.B.C. 1970/1-1974/5

DISCIPLINES (GROUPED)	1970-71			1971-72		
	Univ. Funds	All External Funds	Canada Council	Univ. Funds	All External Funds	Canada Council
Humanities*	51,945	101,659	96,299 (95%)	32,905	62,296	62,236 (99.9%)
Social Sciences	135,495	421,814	219,044 (52%)	124,490	387,800	123,456 (32%)
Education	15,900	139,107	3,810 (3%)	29,150	196,125	1,732 (1%)
Law	2,150	31,618	28,818 (91%)	5,390	4,100	1,100 (27%)
1972-73						
Humanities*	32,380	127,911	124,952 (98%)	25,159	89,536	66,936 (75%)
Social Sciences	56,084	490,116	184,135 (38%)	55,185	776,013.71	207,427.41 (27%)
Education	19,280	33,683	1,086 (3%)	12,150	147,627	21,636 (15%)
Law	3,200	12,950		2,300	14,011	5,483 (39%)
1974-75						
Humanities*	23,755	69,394	69,394 (100%)			
Social Sciences	47,240	525,651.91	134,273 (26%)			
Education	10,900	10,624	2,574 (24%)			
Law	530	15,538	15,538 (100%)			

* Humanities includes: Asian Studies, Classical Studies, Creative Writing, English, Fine Arts, French, German, Hispanic Studies, Italian Studies, Music, Philosophy, Religious Studies, Slavonic Studies and Theatre.

Δ Social Sciences includes: Anthropology, Archaeology, Asian and Slavonic Research, Community and Regional Planning, Economics, Geography, History, Linguistics, Museology, Political Science, Psychology, Social Work, Sociology, International Relations, Industrial Relations.

SOURCE: Report of UBC Task Force.

TABLE VI. 9

NUMBER AND AMOUNT OF RESEARCH GRANTS AWARDED BY THE CANADA COUNCIL
BY FIELD AND DISCIPLINE IN 1966-67 AND 1973-74

Field/Discipline of Study	Number of Awards		Amount of Awards(\$)	
	1966-67(1)	1973-74(3)	1966-67(2)	1973-74(3)
Archeology	8	43	33,572	272,128
Classics	9	12	11,280	62,774
History	61	144	101,487	609,451
English	42	69	60,668	281,339
French	24	36	33,343	204,638
Other Modern Languages	21	42	36,910	83,070
Linguistics	8	36	68,289	291,102
Philosophy	21	17	36,937	43,629
Sub-Total: Humanities	194	399	383,486	1,848,131
Anthropology	11	32	57,257	309,685
Economics	27	51	84,785	386,055
Geography	17	33	34,059	183,722
Law	7	15	16,525	57,607
Political Science	21	44	57,125	478,912
Psychology	15	80	95,430	702,441
Sociology	28	38	161,185	341,315
Sub-Total: Social Sc.	126	293	506,366	2,459,737
Sub-Total: Humanities & Social Sc.	320	692	889,852	4,307,868
Others (unspecified)*	30	83	506,366	554,340
Total	350	775	889,852	4,862,208

* Includes fine arts, mathematics, and architecture.

Source: (1) Canada Council, The Canada Council Programme of Research Grants: Analysis for 1965/66 to 1968/69. Prepared by Dr. W. P. Hettich, Ottawa 1969. Table 1.1

(2) Ibid., Table 1.2

(3) Based on data prepared by Research and Analysis Section of the Canada Council, May 1974.

Notes

1. Senate Special Committee on Science Policy, A Science Policy for Canada, vol. I (Ottawa, 1970), Table 7, p. 132.
2. Ibid., Table 5, p. 128. The figures apply specifically to the natural sciences but the distribution would not be significantly changed by the inclusion of figures for research in the human sciences.
3. Ibid., Table 4, p. 127.
4. Ibid., pp. 129-130.
5. Table VI-1: "Total federal government expenditures on research and development in the human and the natural sciences, by performer, 1970-71 to 1976-77", Statistics Canada, unpublished data. Business enterprises also lost ground during this decade, declining from 23.2 per cent to 18.7 per cent, with most of the increases in research expenditures going to research in the federal government.
6. OECD, The Research System, vol. 3, Canada-United States. General Conclusions, (Paris, 1974), pp. 17-54.
7. OECD, Science Resources: Newsletter #1, September 1976, pp. 5-14.
8. Table VI-7: "Provincial (selected) and federal expenditures on scientific activities in the human sciences, by activity, 1974-75", Statistics Canada, unpublished data. The provincial total was arrived at by doubling the total expenditures for the provinces of Nova Scotia, Ontario, Saskatchewan and Alberta, the only provinces for which such information was available.
9. Table VI-3: "Federal government expenditures for scientific activities in the human and natural sciences, by activity, 1970-71 to 1976-77", Statistics Canada, unpublished data.
10. Table VI-3: "Federal government current expenditures on scientific activities in the human sciences, by department (selected), 1970-71 to 1976-77", Statistics Canada, unpublished data.
11. Table VI-2: "Federal government expenditures for scientific activities in the human and natural sciences, by activity, 1970-71 to 1976-77", Statistics Canada, unpublished data. Capital expenditures are even more heavily weighted in favor of the natural sciences.
12. Table VI-1: "Total federal government expenditures on R & D in the human and natural sciences, by performer, 1970-71 to 1976-77", Statistics Canada, unpublished data.

13. The interests of the sponsor and the broader ones of the discipline are not as unrelated as these procedures imply. If the researcher could participate more directly in the formulation of the project, most contracts would better reflect the interests of the discipline without sacrificing the interests of the sponsor. For a fuller discussion of the relationship between the researcher and the sponsor, see Section Two, Chapter VII.
14. Table VI-4: "Federal government payments to Canadian universities for scientific activities in the human and natural sciences, by department (selected), 1970-71 to 1976-77", Statistics Canada, unpublished data.
15. Table VI-4: "Federal government payments to Canadian universities for scientific activities in the human and natural sciences, by department (selected), 1970-71 to 1976-77", Statistics Canada, unpublished data.
16. Proceedings of Senate Committee on Science Policy, December 15, 1976.
17. Table VI-6: "Comparison of arts and human sciences grant budgets of the Canada Council, 1958-59 to 1976-77", based on data supplied by the Canada Council.
18. See Table VI-8: "Research funds, UBC, 1970-71 to 1974-75", from Report of the University of British Columbia Task Force.
19. See Section Three for an in-depth discussion of the funding of university research in Quebec.
20. See for example, the University of Montreal Report, p. 194, and Queen's University, A Commitment to Excellence, p. 66.
21. The functions of the Social Sciences and Humanities Research Council are defined in similar terms: "to promote and assist research and scholarship in the social sciences and humanities".
22. The Canada Council, Second Annual Report, 1958-59, no. 155, p. 55.
23. In 1976-77, for example, there were 1,340 awards compared to 1,387 in the previous year. In 1976-77, however, there were only 2,895 applications, a decline of almost 300 from the previous year; the success rate in 1976-77 was actually slightly higher than the year before.
24. See the comments of Queen's University Task Force on this point, A Commitment to Excellence, p. 45.
25. Includes Killam awards, research grants, leave and research fellowships.
26. An Exploratory Cost Analysis of Some Canadian Universities. The Report on the Study of the Costs of University Programs in Canada, published by AUCC (Ottawa, 1970) (mimeo), illustrates the difficulty of isolating the research from the teaching activities of faculty members.

27. John B. Macdonald et al., The Role of the Federal Government in Support of Research in Canadian Universities, prepared for the Science Council of Canada and the Canada Council, Special Study #7 (Ottawa, 1969), p. 138.
28. Ibid., pp. 135-136.
29. Ibid., p. 139.
30. Stephen Peitchinis, Financing Post-Secondary Education in Canada (Toronto: Council of Ministers of Education of Canada, 1971), p. 280.
31. Report of a Commission to the AUCC, Financing Higher Education in Canada, University of Toronto Press, 1965, p. 69.
32. John B. Macdonald et al., op. cit., p. 143.
33. "Overhead or indirect costs in university research," a study prepared by Ministry of State for Science and Technology (MOSST) in 1974.
34. An Exploratory Cost Analysis of Some Canadian Universities (mimeo), prepared for AUCC in 1970, was an elaborate attempt to establish all university costs attributable to research. It broke down in part because faculty members could not - or would not - distinguish between time spent on research, time spent on preparation for teaching and time spent on supervision of research. See Appendix III of report.
 A recent study, "Coûts indirects des activités d'enseignement et de recherche," prepared by a study group at Laval in 1977, argues that time spent on a project by the researchers is the most reliable single indicator of the total costs and is the logical basis for any formula to assess indirect costs.
35. See for example, Trevor Lloyd, "Geography: trends and patterns of graduate studies in recent years and future prospects," a discipline study prepared for our Commission in April, 1975. For a fuller discussion of the Canadian experience, see Max von Zur-Muehlen, Postdoctorals in Canada in the Mid-Seventies, Secretary of State, December, 1975 (mimeo).
36. Press Conference, June 1976, cited in University Affairs, February 1977.
37. Table VI-1: "Total federal government expenditures on R & D in the human and natural sciences, by performer, 1970-71 to 1976-77", Statistics Canada, unpublished data.
38. Based on a Commission survey of a selected group of Ontario universities for 1973-74. Data collected by the UBC task force give some support to this analysis. The UBC study did not include the natural sciences but it did show that over the period 1970-71 to 1974-75, the university research grants accounted for approximately 19% of the total grants to UBC faculty in the humanities and the social sciences. The Ontario universities grants in 1973-74 amounted to only 7.2% of the total grants in the humanities and social sciences in that year. In each case, however, approximately 30%

of this amount went to the humanities and 70% to the social sciences.
(Based on Table II of UBC Task Force Report).

39. Table VI-9: "Number and amount of research grants awarded by the Canada Council by field and discipline in 1966-67 and 1973-74".
40. Report of Commission on Development of Graduate Programs in Ontario Universities (Spinks Report), Toronto, 1966, p. 48.

VII JUSTIFICATIONS OF UNIVERSITY RESEARCH

In the Introduction, we implied that the idyll initiated in several countries during World War II between science and the decision-makers of the social, economic and political sectors was coming to an end.

Scientists are discovering that the time is gone when governments, social and economic bodies, and research assistance councils readily funded the growing requirements of scientific research. The limited research funds granted these last few years are certainly due a good deal to stagflation, which prevails in the industrial countries of the Western World. If it was only a matter of unfavorable economic circumstances, the period of austerity for research would end when the current economic crisis is over. However, there are other reasons, more permanent and greater in scope (which we will discuss in this section), that partly explain this recent turn of events.

This is what Jean-Jacques Salomon stated at the Saint-Paul-de-Vence Conference:

There is not just uneasiness in the scientific community... between researchers and society... but also a revolt of the researchers with regard to the end that they serve willy-nilly, and even more so with regard to a social function that would reduce their role to mere technicians serving the authorities or authority that be... It was still possible before to have a clear conscience since science was only concerned with itself and with the aims it promoted and pursued... Today, however, it is most difficult to dissociate the aims of science from other aims that are often foreign to its search for truth, ideals and perhaps even mythology, and from research that is entirely separate from social and political concerns. That science is now so burdened it not only makes us think but also incites us to act.¹

The observations of the OECD on the organization of research in the United States are akin to the more general remarks of Jean-Jacques Salomon:

The relationships established since World War II in the United States between the authorities and science appeared not so very long ago (...) exemplary and unclouded... The idyll is over. Budget constraints and changing priorities have broken the alliance that had assured the joint mobilization of science and political institutions in attaining common goals. The institutional disruptions that have reduced the involvement of scientists in decision-making have increased among many of the latter the feeling of a complete break with the past. Increased government expenditures as a result of the energy crisis could allow certain scientific and technical programs to develop, but the period of privileged relationships between the scientific community and the government is clearly over... these orientations are not without meeting considerable resistance since they always tend to limit autonomous organizations. Generally speaking, the

self-determination itself of scientific communities and institutions is directly threatened insofar as the political authorities require that research activities serve their own priorities.²

In Canada today, the overall situation is similar to that in Europe and particularly in the United States. The funding constraints of the past few years have forced university researchers to adapt. Beyond the simple question of costs, there is the matter of revising the order of research aims that has prevailed for the last 35 years. This revision is necessary and will have positive effects for the researcher and for science as long as it produces constructive reactions.

We have noted many doubts and concerns among those we questioned in the universities and in governments. There is a tendency to fall back on safe positions for the simple reason that these are familiar. Some confine themselves to expressing indignation at the problems they face in their work and demand that the federal and provincial governments increase their funding to research granting bodies, particularly the National Research Council, the Medical Research Council and the Canada Council.

Others feel that merely mentioning the role of research in graduate studies is sufficient to justify research. This is shifting the problem to another level, namely justifying graduate studies in relation to science and society. Furthermore, most research faculty consider that, in addition to contributing to the quality of graduate studies and to the training of researchers, their work is valuable to society. The only obligation they feel to justify their theories, methodologies, study purposes and research findings is toward the university administrations and their peers. Indeed, the controls of the university and their colleagues are quite acceptable to them, since there is a sort of secret complicity that considerably reduces the feeling of constraint. However, these relationships based on cooperation hardly encourage excellence and are a source of favoritism that rightly makes outsiders indignant.

The relationships of research faculty with the funding authorities of public and private bodies are most tense in regard to mission-oriented and contract research. But even relationships with the officers of councils responsible for aid to free research are becoming more difficult. The basic causes of this malaise are easy to identify: on the one hand, funders are concerned about research expenditures growing at too fast a rate; on the other hand, increased programming within governments enables the establishment of priorities;

consequently, research is no longer considered a privileged activity but merely an element of forecast for government officials. It is impossible, therefore, to fund all the types of projects, and choices must be made. But who is capable of making them? That is the crux of the problem.

As research becomes more expensive, a kind of law of supply and demand develops. The researcher is beginning to realize he cannot offer just any product any time with the assurance that there will always be a buyer. Indeed, research contracts are becoming more precise and more demanding. Research faculty, whether they like it or not, are forced to justify their projects and even their methods of work. Faced with the prospect of no financial aid, they must undertake the research work proposed by the decision-makers without having a say in its objective or orientation.

Still others view these funding constraints in research as beneficial, since they give scientists the opportunity for a dual reassessment of their conception of research for the past 35 years, and the nature of the relationships they have maintained during this period of exceptional affluence with various governments.

The problem now facing researchers can be formulated as follows: the limited government funds for research and the intention of governments to modify research orientations (an often declared intention in recent times) should result in an in-depth examination of the situation rather than in the harnessing of scientific research or the useless revolt of the most competent researchers. Such an assessment would enable research faculty and the bodies to which they are responsible, especially universities, to conduct a complete reevaluation of their activity and their responsibilities toward science and society.

Unfortunately, dealing with the justification of research from this angle is often restricted to research in the natural and health sciences. Yet this situation applies just as much to the human sciences and has the same effects. Like their colleagues in the natural and health sciences, researchers in the human sciences have fewer research funds today than in former years; moreover, their funders tend to lay down conditions and set orientations that reduce their margin of liberty.

Research granting organizations, public and private bodies and universities themselves intervene directly in the research process when funds are required. But they have no authority to intervene when the researcher does not need funds.

Research could be freed from external controls that are too restrictive by a reduction in expenditures. In some cases, the gains would offset the losses, if the researcher learned to work again with modest means.

Under the present circumstances, any expensive university research - which is increasingly the case in the human sciences - will need to be justified more and differently to funding bodies than in the past.

University researchers will increasingly need to advocate that a portion of the national budget continue to be provided for the development of research. They will have to justify their demands and compete with those of other groups seeking a share of public funds. They will mainly need to adapt to new conditions resulting from the establishment of research bodies within governments.

Henceforth, science policy will become a rather minor element of national policy. Like all other social activities, research will be increasingly subject to the economic rule of the relative scarcity of public funds in relation to the growing needs of all social groups and to the influence of increasingly "persuasive" pressure tactics used by some groups eager to get the largest possible portion of these funds. Research faculty will need to have organizations capable of securing the attention of decision-makers, if they wish to obtain the portion of funds to which they feel they have a right.

In the present situation, university research expenditures are not the only source of concern. The overall expenditures of postsecondary education have grown exponentially for the last 15 years, the federal government's share alone exceeding \$1 billion in 1973-74, or about 50 per cent of the overall funds.

A curtailment operation is under way in the federal government and, consequently, in the provincial governments; all university operations are feeling the effects. The university is directly affected at two levels by the current discussions on public funds for university research: first, the subsidization of research from general operating funds and second, the extent to which the university intends to support research specifically. The growth of university research will depend, therefore, on the degree to which the lobbying conducted by the universities, their associations (e.g., the Association of Universities and Colleges of Canada) and especially the provincial research organizations will be successful in influencing government decisions.

Public opinion is another factor that increasingly affects government

decisions in allocating funds to scientific research. Whereas formerly the public perceived only the beneficial aspects of science and technology, it is now questioning the latter's value and their effects. Scientists must seek to determine the reasons for this reversal of opinion and modify their research designs and methods accordingly. To achieve this end, the involvement of learned societies, their associations, the three scientific councils and the Science Council must be sought.

We have stated the importance of university research for the university. Some consider this justification of research to be sufficient. It is a matter mainly of examining university research by taking into account the conditions for the advancement of science and the expectations of public and private bodies, the public and the councils providing aid to research.

One must therefore examine the reasons for university research in such a manner that its main employer, the government, will continue to provide funds without imposing excessive constraints. For some, the mere fact of declaring that the major user of research is nowadays the government is to single out the first source of the problem.

Given these conditions, a self-appraisal is required - even more so since human science research has just begun to develop. Is this type of research on the wrong track? Has it become a "luxury" which a society grappling with a serious economic crisis cannot afford? Or, can it be pursued only if it has enough useful and demonstrable "repercussions" or if it contributes to attaining predetermined "national" interests?

University researchers must examine the same questions raised with growing insistence by granting bodies: "Why fund university research in the human sciences? What use has been made of earlier research findings? What end can they usefully serve today and in the near future?"

In the following exposé, we will mention a certain number of arguments of university researchers aimed at proving that productive research must be free from any meddlesome control on the part of funders. This will be followed by the opposite arguments that scientific research should receive the financial aid it demands only if it is "relevant" and serves the "public interest". We will then point out the motives of those who adopt an entirely different position and who challenge research both in its premises and its findings. Finally, we

will indicate the reaction of researchers and funders to these challenges.

There are internal and external criteria for the justification of research. According to Alvin M. Weinberg, who makes this distinction,³ the internal criteria bear on the quality of the required effort. The following questions relating to these criteria can be raised: "Is the field ready for exploitation? Are the scientists involved in it of sufficient competence?"

Weinberg writes that these criteria alone are not sufficient to justify research:

It is not tenable to base our judgments entirely on internal criteria... Science must seek its support from society on grounds other than that the science is carried out competently and that it is ready for exploitation; scientists cannot expect society to support science because scientists find it an enchanting diversion.

With respect to external criteria, Weinberg suggests three; the first of these, technological quality, is the easiest to perceive:

Once we have decided, one way or another, that a certain technological end is worthwhile, we must support the scientific research necessary to achieve that end. It is not always easy to decide the technological usefulness of a piece of basic research. However, it is my belief that technological bolts from the scientific blue are the exception, not the rule, and that solving a technological problem by waiting for spinoff from an entirely different field is rather overrated.

But according to Weinberg, the other two external criteria, scientific merit and social merit, are not as easy to discern: "scientific merit because we have given very little thought to defining it in the broadest sense; social merit because it is difficult to define the values of our society." Weinberg suggests nonetheless the following definitions:

Scientific merit can perhaps best be defined by proposing that, other things being equal, that field has the most scientific merit which contributes most heavily to and illuminates most brightly its neighboring scientific disciplines.

It is, however, the determination of the "social merit or relevance of research in relation to human welfare and values" that causes the most difficulty. Yet, René Dubos states the following:

It is also the most important because, in the end, our values shape our knowledge, which in turn determines the quality of human life. Depending upon their professional experience, knowledge of human situations and judgments of value, individual scientists differ as to the areas of science which they consider to have greatest social merit.⁴

We will draw from Weinberg's distinctions to help us develop our own line of argument.

1. Internal Justifications

One of the commonly used arguments in favor of unconditional aid to science is the following: "Is science not worth 3 per cent of the gross national income?"⁵ The argument is also presented as a paraphrase of the famous saying: "What's good for General Motors is good for the United States"; it is stated almost verbatim: "What's good for science is good for society."⁶

These arguments are too arrogant to be used intentionally by those who favor the complete autonomy of science. Furthermore, the arguments for the unconditional autonomy of scientific research are better supported and apparently more convincing.

a. Science's Own Logic

According to some scientists, the main driving force of research development is the structure of science itself, its own internal dynamic. J.W. Grove states the following:

The progress of science is governed, in large measure, by its own internal dynamic, not by public demand. Some fundamental science, certainly, is done in the knowledge that it will have an application; but even when that is the case, that is not the motive for doing it, and never has been. The motive is always curiosity, curiosity about the marvelous and gorgeous frame of the world.⁷

We do not deny the importance of scientific curiosity in research. But other quite different motives also intervene, such as pursuit of power, vanity, ambition or even simply the need to work to earn a living.

Personal motives are not the only factors that affect the design and implementation of a scientific project. Internal and external stimuli exerted on the researcher are just as important.

When this question is dealt with overall, we are led to conclude that scientists often have a great deal of room to manoeuvre. Thus, scientists themselves often choose their research subject, and they can redefine the questions raised by others in relation to their objectives.

More so and contrary to common belief, scientists often influence decision-makers rather than vice versa. For example, the series of discoveries that made the atom bomb technically possible did not result from a government "contract". And it is not the Defence Department of the United States that decided some day it wanted an atom bomb, and that requested its production by physicists. As noted by Jean-Jacques Salomon, it was on the contrary "Albert Einstein, the

scientist, who through an intermediary told Franklin Delano Roosevelt, the decision-maker, that such a bomb was possible. Science became henceforth a political act and a political problem".⁸ The letter signed by Albert Einstein was written by two scientists, Enrico Fermi and Leo Szilard, and was transmitted to Roosevelt by businessman Alexandre Sachs, a friend of the president. This letter is dated October 1939. Yet, Einstein declared in early 1939 that he did not believe that "the release of atomic energy was possible in the near future". In this case, it was scientists and not the political authorities who forced the hand of one of the greatest scientists of all times. Roosevelt, the politician, hesitated a long time before releasing funds and signing the documents that allowed the Defence Department to seek out solutions to the scientific and technical problems of applying Einstein's theory. According to Salomon, this historical act marks the beginning of the "new alliance" between science and politics. Science itself demanded and obtained this "new alliance" without realizing that, in so doing, it sharpened the appetite of this monster which, following World War II, became what President Eisenhower, in his last message to the American nation, labelled the "military-industrial complex".⁹

Conversely, it is a common thing to overestimate the ability of decision-makers to influence the assumptions and orientations of scientific research. Stalin and Soviet officials did everything, especially between 1929 and 1932, to kill "free" or "bourgeois" science. Yet, as noted by David Joravsky, except for genetic biology, science suffered very little from all the persecutions and interference to which scientists were subjected by one of the most totalitarian regimes history has ever known.¹⁰ Leopold Labedz writes in the same vein that, well before the first Sputnik in 1957, science had great prestige in the Soviet Union. He states that even the "great purge" of 1937-38 had a beneficial effect, namely that of "freeing" the country of many of its most traditional scientists and Old Regime bureaucrats who were against science. The persecutions did not lead to a "flight from science", nor did they prompt scientists to engage in "safe" research. Labedz adds, however, that the human sciences (called "general sciences" by the Soviets) were another exception along with genetic biology. Indeed, the persecutions were very harmful to these sciences, and strict controls still continue nowadays to curb their development.¹¹

These authors tend to indicate that government and other controls did not

prevent the normal development of science. In other words, science's own logic is such that no outside force can prevail against it. The progress of theory gives rise in itself to other theoretical developments: the application of theory raises in itself new theoretical questions. Theory responds to these questions according to its own inherent laws, and so forth. This argument, though valid for specific cases, is only half convincing. Indeed, it is the situation as a whole that would need to be considered. However, even the best analyst would not be able to measure the effect of the general "climate" or overall social environment on the state of mind and orientation of scientists. Thus, we know what has become of biology, physics, chemistry and the other disciplines in the Soviet Union despite a hostile environment; but we will never know how they would have progressed in a favorable environment.¹² As noted by the authors, the strict controls imposed on the human sciences did curb their development. In view of the particular characteristics of the theories of these disciplines, the researcher is more subject to the influence of the dominant ideologies. This unfortunate situation certainly affects us a great deal. What needs to be remembered here is that the human sciences seem more vulnerable to outside controls than the natural and health sciences.

b. "Purity" of Science

During World War II, science and politics actually formed an alliance. Scientists had many reasons to agree with this and thus had few reservations; in fact, they often made the initial overtures. They do not want it said that science was taken over by politics. In the last 35 years, they have had profitable relationships with governments and private enterprise. However, they consider themselves to have played the primary part in these relationships and not the leaders of public and private bodies. In their view, science is untouchable, and they themselves should determine the needs and orientations. If this position were rigorously maintained, science would be a true state within a state in the name of "purity". And sometimes, "purity" of science is confused with "purity" of scientists - two very different realities!

According to this argument, the researcher pursues a single objective - truth - and he fulfils his role properly only by remaining free from any outside interference. The absence of any control over the terms of the actual research

is assumed to be inconsequential since a true researcher cannot err.... And, if things do go wrong, then technology, the legitimate but "impure" child of science, is said to be to blame. Seen by some scientists as the "superior" form of knowledge and still by others as virtually infallible over the long term,¹³ science would have, therefore, every right to claim this particular status of independence. To carry forward this line of thought, no subject could be studied outside of science, and no form of scientific inquiry should have any restrictions, whether moral, humanitarian or otherwise. Even in the case of research on subjects as delicate as heredity and the human brain, or "internal security", and when conducted for reactionary or totalitarian governments, many researchers consider themselves the sole judges in the matter. According to a survey by Ladd and Lipset, this is truly the feeling of the great majority of American university teachers, whatever their disciplines and ideological tendencies.¹⁴

It would be hard to cite a better example of a creed to the "Republic of Science".

Researchers who share these views will concede that the extent of existing research costs justifies the elaboration of a science policy; they consider, however, that science is too important to be left to politicians, businessmen, union leaders, the military or pressure groups and that science policy must come from researchers alone. In the present context, such an extreme stand is, in our estimation, untenable.

Many researchers are fearful that outside influence will unlawfully encroach upon the traditional rights of researchers, and some have proposed that a "Declaration of the Rights of Science" be drawn up.¹⁵ This charter would be intended primarily for governments and major bodies that force researchers to prove at the outset their "loyalty" to the nation, to the business creed, etc., this proof sometimes even requiring that they take an oath.¹⁶

In this period of inter-institutional relations that are often characterized by competing forces and whose ethical dimension is often sloughed aside, such a charter of the rights of science could indeed play a useful role. Some of the forms of external intervention in scientific research much be condemned. This document, or any other such document, must set forth the ethical elements governing the conduct of researchers in their relationships with sponsors and funders.

We are opposed to the rigid and unilateral positions taken by researchers who portray themselves as "wise virgins". Canadian researchers certainly have many reasons to be offended by the attitude and behavior of their counterparts in various bodies. However, they are not always as "pure" as they would have us believe.

It is undoubtedly wrong to state, as is sometimes done, that researchers would do any work for money. However, their situation is such that they must give increasing attention to money matters. Nowadays more than formerly, "disinterested" science means "poor" science, and "useful" science means "rich" science. Researchers move with the times, and they naturally seek to make maximum use of all the new technical and human resources available. These resources are often very expensive. If their work is to conform to today's requirements, they must opt for "rich" science. However, they run the risk of compromise in their relations with funding bodies, and their remarks on the "purity" of science thus become rather platonic.¹⁷

Officers of public bodies have made ambiguous, in fact totalitarian, statements concerning university research, and this has caused justifiable apprehension among researchers. Since they hold the purse strings, they even say bluntly to researchers that they must learn to fall in line if they want grants.

According to Jean-Jacques Salomon, this tendency is not peculiar to Canada:

Shortly after World War II, the future of science became linked with that of the public powers: the question of the political use of scientific research is raised, therefore, in relation to the growing needs of research and the effect of its findings on political affairs. Science has become inseparable from politics, which allow the former to develop; in addition, science closely participates in decisions that determine the direction of politics. Even though the practice of "pure" science appears unchanged - i.e., research initiative and procedures are not subject in any way to directions unrelated to the curiosity or interest of those conducting the research - its choice of topics is made in the context of institutions, mechanisms, procedures and decisions over which it does not have sole control. The government of science may be more or less liberal, flexible or decentralized; in the final analysis, it always depends on the system of political decisions that assures its resources.¹⁸

Canadian university researchers did not hesitate to denounce the remarks made in 1973 by Mrs. Jeanne Sauvé, then Minister of State for Science and Technology:

We look forward to a shift toward research on societal problems and away from ivory tower research with respect to government-funded activity... Some may argue that things are moving too fast but, if universities do not participate

in this wider opportunity to serve society, the government will continue to fund research at increasing levels in government laboratories or in cooperation with industry.¹⁹

This statement by Mrs. Sauvé would not have drawn as many reactions if it had been made at another time and if it had not expressed the conviction of many federal and provincial bureaucrats. The indignation among university researchers may result from some of them having had a bad experience with mission-oriented research and from others who would willingly do such research if they were given the opportunity.

Mrs. Sauvé's remarks were unwise and ambiguous. Were they based on the utilitarian or "instrumentalist" conception of science that J.W. Grove quite rightly denounces?²⁰ Or were they merely intended to tell researchers that they should increasingly take into account pressing social needs in their choice of research? We agree with the latter conception. In our estimation, the "purity" of science cannot be justified by an "ivory tower" approach but by the interdependency of a creative dialectic of new knowledge between the theories and the subjects studied. Why should the former Minister of Cultural Affairs, publically responsible for an important activity sector, not have the right to give her opinion on the nature of the primary concerns of society? The validity of this position is based, however, on a complex distinction between science and the subject of scientific research, which requires some explanation.

c. Freedom of Choice and Research Subject

Like any other collective activity, scientific research is not conducted in a social vacuum. The university and researchers are accountable to the bodies and groups that make up society. There is nothing wrong with the fact that various social organizations indicate to researchers the sectors they consider important and even reprimand them if they feel they are neglecting these sectors. However, it would be unacceptable totalitarianism if they sought to dictate methods and conclusions to researchers. After Stalinism and McCarthyism, there is some fear among researchers that this totalitarian mentality will infiltrate public bodies; they take a hard stand, therefore, against any external intervention, however harmless.²¹

Researchers rarely deny society the right to examine research orientations, and they readily accept certain social responsibilities.²² How should they meet

these responsibilities and still respect the rules of science? They jealously prize their independence. Society wants them to be increasingly interested in social change, individual and collective rights, demography, regional disparities, pollution, urbanization, underdeveloped countries, sociopolitical institutions of industrially developed societies, bilingualism, etc. Researchers have no objection at all to being reminded of the importance of these questions in a society like Canada. They balk, however, at the vague argument of "national interest", which some politicians and technocrats raise since they themselves initially examine each of these questions scientifically.

Though they admit that the decision-makers have a right to identify priorities, they consider their views as indicative and not imperative, since social objectives must not interfere with scientific requirements. One could cite, in fact, a long list of grotesque suggestions from decision-makers who were ill-advised on the facts or initial assumptions.

Until recently, those grappling with choices were mainly researchers in the natural sciences. The "national interest" seemed to require that they focus their efforts on nuclear, spatial and military research; however, once their brief honeymoon was over with the bureaucrats of the defence departments of various countries, these researchers asserted that there were other equally valid questions - if not more so - concerning the progress of knowledge and the development of society.²³ Today's researchers in the human sciences have become as vulnerable - if not more so - to these kinds of demands, which are sometimes a form of insidious blackmail.

Researchers advance a third argument to establish the autonomy of science: the normal development of knowledge requires that scientists alone define the subject matter of their research. Only the advanced state of theories and methodologies can enable an accurate choice of the areas of research. The acquisition of new knowledge is dependent upon the dialectic between theories and methodologies and the field of subjects.

This type of reasoning runs counter to the conceptions of the managers of bodies that oversee or subsidize university research: university administration, other administrations, councils providing aid to research, pressure groups, etc. These bodies believe they have more or less the right to affect the choices of research areas. They believe that this does not victimize in any way the particular

approach of science.

This is not the position of researchers, who demand the freedom to choose the subject to be studied and who wish to be accountable only to their peers. Any outside solicitation is considered taboo. Their duty is to adhere strictly to the rules of their respective disciplines.

Stated as rigidly, these two conceptions are poles apart. In practice, however, the motives behind the choices of researchers are not always as pure as they indicate. Though the decision-makers may ignore the directions of science at any one time, they have no firm desire to oppose them in our society.²⁴

Science's own logic determines, often fortuitously, the subject of research. There are thousands of examples, from the rise of astronomy and physical engineering in the 17th century to that of microbiology in the 19th and nuclear physics in the 20th century. Thus, the calculation of longitude, nuclear fission and the production of food from the cultivation of unicellular organisms have resulted fortuitously from theoretical applications based on the logic of science. At the same time, decision-makers consider these results valid for society and agree to provide assistance.

The very opposite of this also occurs. According to Jean-Jacques Salomon, "all scientific policies are generated by war". In other words, an external force - usually a government - dictates to scientists the field of research they are willing to subsidize. This external force, therefore, directly intervenes in the scientific logic, that is in the underlying theories and methodologies.

One must be wary of confusing the "subjects" of research with technology - that is, the application of science to achieve practical results. The choice of "subjects" is made at the start of the research, and technology comes in at the level of practical application. The debate on freedom of choice often results from this confusion; in this case, it is sterile.

Researchers and decision-makers may confront one another concerning their respective rights to orient the choice of subjects to be studied, the former on the basis of the criterion of scientific reason and the latter on the basis of practical application in relation to the ends sought.

These two conceptions are not diametrically opposite. Though "politically" inspired, the choices of decision-makers are not necessarily opposed to the development of theories and methodologies. They are as valid in this case as

those of some researchers who are much more self-seeking than they would have us believe.

Researchers find considerable justification in their work in the benefits they hope to get from their university and the scientific community generally: more rapid promotions, better salaries, greater prestige, etc. These objectives are legitimate, but it would be naive to take the word of researchers that they choose the subject of their study on the sole basis of scientific considerations. They do not always resist seeking more recognition from university administrators, their colleagues and society in general.

It is sometimes stated that time is not important for university researchers and that they are guided by the rhythm of science. However, this ignores the constant pressures they face: research requiring an immediate start because of waiting assistants or students or because of a grant; progress reports on the research to be submitted to the funding bodies; the obsession that a grant will not be renewed; works that require completion and publication before they are totally "obsolete"; lengthy and often difficult negotiations with the publishers; and the constant fear of being overtaken by others. In short, researchers suffer from a chronic lack of time. The pressures do not come from the inherent constraints of research or science but from all the minor external problems they must solve as well and as quickly as possible to maintain their involvement in the development of knowledge.

It is quite normal for these researchers to submit to these numerous external conditions. They are less justified in rejecting the suggestions of decision-makers, who urge them to study a given point, under the pious pretext of interference with the "natural" rhythm of science.

Decision-makers perceive research time in relation to their own particular roles and interests. They consider themselves the legitimate interpreters of the needs that research can help to meet. In actual fact, they intervene most often to satisfy personal interests or in response to individual and group pressures. They in turn are indignant at the lack of response on the part of researchers.

The conflict at this level between researchers and decision-makers results more from mutual misunderstanding than from incompatible objectives. A little more humility and generosity from the former and greater flexibility from the

latter would be sufficient to solve most disputes concerning the determination of research subjects. As a rule, the choices of neither one nor the other are better or worse. The particular circumstances around given concerns should be the determining factors.

There is, however, a basic incompatibility between researchers and decision-makers whenever the latter intentionally or inadvertently propose research subjects unsuited to scientific method and logic, the only guarantors of the development of knowledge. Researchers must uncover and expose these cases as quickly as possible and follow their professional ethics, even if this entails noncompliance with external instructions. However, interference cannot always be easily determined. On this point, it is necessary to distinguish between the natural sciences and the human sciences.

The theories and methodologies of the natural sciences are sufficiently developed to determine at what point the examination of a subject ceases to conform with scientific logic. The reason for this discrepancy may be the lack of theories or methodologies, or simply the fact that in the current state of knowledge it would be premature or redundant to conduct a scientific study on a given subject. These sciences rarely need to justify their existence and orientations or their research subjects and findings. Discussion centres rather on the sharing of research areas between the university and other bodies such as nonuniversity institutions or the research departments of public and private bodies.

Unfortunately, this is not the case for the human sciences. All researchers and decision-makers deplore the state of underdevelopment of the theories and methodologies of most of their disciplines. It is much more difficult, therefore, to determine the scientific repercussions of the research subjects chosen by researchers or those proposed by decision-makers.

The assessment of the situation of theories and methodologies in the various human sciences is a matter of urgency. Some question their validity, especially bureaucrats, natural and health science specialists and even officers of the Canada Council and university administrators.

One would think that the efforts of recent years would have reduced if not dispelled these concerns. But this is not the case. One of the reasons is the inability of the human sciences to deal with the many serious problems brought to their attention, whatever the criterion used to measure their work.

More than ever before, circumstances require that the merit of the theoretical foundations of human science research be tested, the reasons for deficiencies be determined and the means to correct the latter be identified.

2. External Justifications

According to Alvin M. Weinberg, it is difficult to justify university research in relation to the internal criteria of scientific activity. As we have seen, this difficulty extends to both the natural and the human sciences.

But what about the three external criteria - scientific merit, technological merit and social merit - which, for Weinberg, more easily justify scientific research? The social significance of scientific research must be determined in relation to each of these three criteria. While this can be done relatively easily in the natural sciences, it is much more difficult to do so in the human sciences.

a. Scientific Merit

The natural sciences have no problem justifying to society their status as scientific disciplines. This is not the case with the human sciences.

There is little research on the self-perception of researchers as scientists. In the last few years, universities, and to a lesser degree research granting bodies, have tried to develop - usually for practical reasons - quantitative and qualitative indicators of the scientific merit of studies conducted by research faculty: number and extent of research projects over a given period (volume and quality of publications, reports, manuscripts, research notes, articles and books); readership of the journal or publisher printing the works; number printed and sold; number and extent of quotations from a published work; number of reprintings, reproductions and translations; reputation of a printed work; prizes and honours received - these are all indicators to be weighed.

Researchers refuse to acknowledge the merit of these indicators, which they view as the work of an ignorant bureaucratic intervention and an artless application of the discredited principle of "publish or perish". Many teachers even refuse to answer the many questionnaires received from various bodies.

Granting bodies have been questioning research output for some time. Both the National Research Council and the Canada Council seek to make research grants

to the most appropriate individuals and for the most valid projects. The National Research Council is quite generous toward young researchers, to allow them to prove themselves; other researchers are assessed on the merit of their previous achievements. The Canada Council consults specialists from the discipline concerned to assess each project.

The Canada Council is increasingly interested in the work carried out with the help of its research grants; to this end, it recently conducted a questionnaire survey. The findings indicated that 85 per cent of those with research grants in 1969-70, 1970-71 and 1972-73 had, in 1975, at least one publication, article, paper, report or book resulting from their research.²⁵

As a whole, Canadian social science researchers do not seem to have done very well at the international level. Up to 1965, not a single research work by a Canadian social scientist was hailed as a major contribution.²⁶

Compared with natural science researchers and based on a study in the United States quoted earlier, social science researchers do not appear unduly concerned about the scientific merit of their work or the potential development of knowledge from their own publications.²⁷ As seen earlier, the manuscripts in the specialized social science journals are published several months later than those in the specialized natural science journals.

This time lag is explained in part by the much greater quality of the natural science communication systems. Other factors must also be taken into account and explained, particularly the different attitudes of the editors of social science and natural science journals - the former are more concerned than the latter about form and style. What are the motives of the authors? According to this same study, 18 per cent of natural science authors choose their journal on the basis of rapid publication, but only 6 per cent of social science authors do so in relation to this criterion. The latter's primary concern is the readership of the journal, which is rarely the case for the former.

The reasons for rejecting a manuscript are also different in the natural sciences and the social sciences. Rejections are rather rare (12%) for the former, and they are based mainly on the fact that the subject of the manuscript is not within the scope of the journal. Rejections are much more numerous (33%) for the social sciences, and they are based on actual content and the theories and methodologies used.

We have identified the seemingly basic reason for the difference between the two situations. There are universally accepted scientific and methodological criteria in the natural sciences, while those in the social sciences are much more controversial. In the first case, it is much easier to evaluate concretely the contribution of a manuscript to the development of knowledge; this is less possible and less consciously sought in the second case. The considerable gap in the percentage of rejections can be explained partly by the differences in the quality of manuscripts and in the evaluation criteria of the journal editors. It is probable, however, that the reasons for publishing are not the same. In the natural sciences, a manuscript is considered above all as an ultimate component in the development of knowledge in a given sector, and it is made available as quickly as possible to the scientific community whose members are seen as the true judges of the merit of the publication. In the social sciences, the opposite principle is applied at the outset: the merit of the manuscript is unknown, and it must be assessed before it is made available to the scientific community. The publication delays resulting from this are rather unimportant, since there are in the social sciences no universally accepted systematic criteria for the development of knowledge.

The authors explain these different conceptions as follows:

One cannot help but interpret the data... as reflecting the eclectic nature of social science subject matter. As we have seen, social science authors and social science editors often disagree on the appropriateness of required revisions; the social science editorial process tends to concentrate heavily on the mechanics of the work, i.e., on statistical procedures and methodology; although social science lacks the theoretical framework of physical science, the reasons frequently given for rejection of social science manuscripts involve theoretical and interpretational problems; and although social scientists conduct various kinds of research on similar problems, there appears to be relatively little ground for judging the controversy of their findings. In addition, though core journals in the physical sciences usually reject manuscripts and receive few previously rejected manuscripts, the social sciences repeatedly recycle manuscripts rejected by some core journals by resubmitting them to other core journals.

This is based, once again, on partial studies conducted in the United States. We have the impression, however, that this study is a good reflection of the present Canadian situation: specialists in the human sciences are poor evaluators of the scientific merit of their respective disciplines. We would be surprised if decision-makers and the various social agents did not share this conviction.

b. Technological Merit

Another way of evaluating scientific research in the natural or the human sciences is to determine the extent of technologies resulting from research.

Arthur J.R. Smith makes the following statement:

In the field of the natural sciences, it is the innovation process - the transmission of knowledge into viable technologies - through which scientific knowledge serves society. In the social field, it is necessary to have a similar process, which may perhaps be called "social technology", for translating knowledge into viable programs and courses of action, if the social sciences are to help to serve a society's needs and interests.²⁸

Even in the natural sciences, it is not easy to determine the exact relationships of research, technologies and innovations. These are even harder to perceive in the human sciences. The fact is that there has not been a serious examination in the human sciences of the contribution of research to the development of social and human technologies.

In the natural sciences, there are close relationships between research and industrial technologies; however, there have been few attempts to accurately assess these relationships.

Our starting point is a study by Walter Hettich conducted for the Canada Council's Commission of Inquiry into the Rationalization of University Research.²⁹ Even though this study deals only with the natural and health sciences, it could prompt researchers, research authorities and administrators in the human sciences to take stock of this question and to assess the complexity of the task.

Walter Hettich uses the cost-benefit approach to determine the technological merit of research. This consists in establishing the total costs of a given research project and the money value of the technologies or products of this research. He cites as an example the overall research that led to the production of hybrid cereals and whose total cost was very high. However, the results were very significant, with benefits reaching over 700 per cent annually.

Hettich points out in his analysis, however, that the method of assessment has serious deficiencies.

Research is generally and mainly conducted within a national context, but the technologies that result from it can be found in many countries. In fact, technologies sometimes benefit a country that has not invested in research, while the country that has provided the funds hardly draws any direct benefits;

its technologists and innovators may have lacked creativity, or the potential technologies may not be suitable in view of its industrial infrastructure, its climate, etc.

In addition, any rigorous cost-benefit analysis can only be conducted a posteriori - once the technologies have been implemented and their output measured to some degree. It is very difficult and often impossible to make an a priori analysis, that is to forecast even the approximate output of the technologies resulting from research. Many research activities conducted in the universities and research laboratory councils have had an impact, irrespective of potential applications, on important technologies and have even led to the creation of new industries, often in less than one generation. This has occurred with the electrical, electronic and nuclear industries. Except in particular cases, it would be unwise, therefore, to apply the cost-benefit method to a research project, since the ultimate practical applications are too hypothetical.

Hettich observes that research must be considered within the overall disciplinary or interdisciplinary system in which it was conducted, if the cost-benefit method is to be used properly. Research directly linked with specific technologies has often presupposed other research that has no direct link with these technologies.

This method of analysis creates problems not only in the natural and health sciences but also in the human sciences. In addition to these sources of complications, there are others in the human sciences: how to determine the research that has led to given social technologies and, where possible, how to establish the research costs and the technological outputs? Hettich believes it would be better to forego this method of analysis and to utilize only a qualitative approach that is less accurate but more adequate:

The benefit-cost approach has been applied only with regard to pure and applied research. Other categories of research output do not easily lend themselves to such analysis. Research activity which can be classified as creative arts, for example, must remain largely outside the framework used in economic studies, although it can make an important contribution to the quality of national life.

In the most developed social sciences (economics, social psychology, anthropology, sociology and political science), would it be possible to measure the research/technologies relationship through cost-benefit analysis? It might be advisable to do so, even approximately, for some social and human technologies.

This could be applied to various technologies: quantitative and qualitative social indicators, status scales of occupations, measures of social inequalities, survey methods, input-output analysis, linear programming, and so on. Even in these cases, the calculation of the output would be quite difficult, since the costs of many types of research would generally need to be included; there would necessarily be a great deal of subjective assessment in the calculation of the annual benefits from social technologies resulting from research.

There is increasing reference to the importance of social and human technologies and to the special role of the human sciences in their implementation. The Report of the Senate Committee on Canadian Science Policy examines this point in detail. To solve their problems, industrially developed and underdeveloped societies will need to have recourse to new forms of community and individual lifestyles; to a large extent, it is up to the human sciences to suggest the latter. In fact, over the next decades, social technologies will have to be granted as much if not more importance than industrial technologies, whose development until now has been the main spur of scientific research.

We know very little about the relationships of human science research and existing technologies or the extent of the role of these sciences in the development of new technologies. Most social and human technologies - both present and future - will probably result from multidisciplinary research in the human, natural, and health sciences. Such studies, however, are still embryonic.

According to David Easton, social sciences have exploited very little of the potential of modern culture:

It may be true that in the natural sciences technology has outrun culture and thereby has helped create many of the difficulties that our complex world now faces. But in the social sciences our technology has a vast distance to go before it even catches up with the needs of our culture, let alone surpasses them.³⁰

This is the major challenge facing the human sciences. Are these disciplines capable of producing the social technologies expected of them? Human science researchers must develop these technologies. It is not only a matter of major scientific breakthroughs but the survival of humanity - these are the stakes. Is there not the risk of perceiving subjects as fashionable, e.g. protecting health and the environment, and labelling them "scientific" without knowing whether it is possible at the time to deal with them scientifically?

If the answer is yes, would the research projects solve the problems raised or would the resultant technologies have the anticipated effects?³¹ The current interest in the human sciences is based mainly on the probably exaggerated hope that they will be able to provide answers for a humanity in dire straits.³²

c. Social Merit

The criterion of the social merit of research is the most subjective and the most difficult to determine. There are many individuals from various sources who consider themselves able to define this criterion. However, the latter's interpretation depends ultimately on the personal and professional values of each individual and on how science is seen as promoting these values.

The criterion of social merit may be dealt with solely in relation to the social results of research. It is also possible to provide an integral definition which implies that the results of research for society and science are known. Any discussion of the social merit of research must take into account these two series of results. We concur with Robert M. Pirsig, who asserts the following in his fascinating book: "Our whole system of knowledge stems from their results. We've yet to understand the methods that produced these results."³³

In other words, scientific research must be related to its results, but the latter must constantly lead back to science by clarifying its approach and raising new questions. Science is understood and, in the last analysis, justified only in terms of its results.

Once these premises are established, it is necessary to define what is meant by "results". This question is very controversial, especially for those who wrongly maintain a rigid distinction between pure and applied research.³⁴

The question of research results is often reduced, and wrongly so, to a simple debate on social "usefulness" or "relevance".³⁵ In fact, it is the actual ability of science to answer the questions raised that is being challenged. However, there is no better explanation to be found in research results than in the conditions of research theories and methodologies.

Contrary to common belief, the arguments used to judge social "usefulness" or "relevance" must not be limited to an assessment of research results in relation to the expected "output" as defined in very instrumentalist terms. The arguments must also indicate whether the results encourage a dialectic between

the theories and products of research.

The emphasis in the last few years on "usefulness" and "relevance" may or may not be admissible; it depends on whether those who advance this argument have only a rudimentary instrumentalist conception or whether they have regard for the basic and necessary objective of researchers. According to the instrumentalist conception, the researcher gives the findings of his research to society in return for the grants received. With regard to the basic objective in question, it may be stated as follows: the researcher must arrive at socially useful results which enable a dialectic of theory and its application and which lead to other theories.³⁶ In other words, the argument presented above concerning relations between research theories and choice of subjects also applies to relations between theories and results when the former are applied to meet social needs.

We are dealing, here again, with the difficult situation of the human sciences. At the present stage of their theoretical and methodological development, these sciences are not very capable of producing useful results for science and society. So writes David Easton about the social sciences:

Broadly speaking, the social sciences are ill-prepared for the policy tasks that society would require of them and that they themselves have at times been only too eager to fulfil. At the present stage of their development, the social sciences are clearly unable to make the kind of contribution to the formulation of public policy that either they or the public might appropriately wish... In the face of all these difficulties - the early stage of the development of the social sciences, the low reliability of our generalizations, the specialized nature of such knowledge as we do have and our difficulty in reassembling it - we are now asked with a special sense of urgency to help resolve some of the most complex problems that our civilization has ever faced... The social sciences are not yet prepared to answer such global questions about the unity of political systems or whole societies and their relationship to alternative policies in these areas. The social sciences simply do not have the necessary conceptual and technical apparatus to obtain reliable generalizations about the way in which whole social systems operate. As yet it is hazardous for us to attempt reliable predictions about the effects of alternative grand policy designs for preserving the unity of a system... On general grounds, taking into account present knowledge in the social sciences, we ought not to hold out the expectation that social science can go very far in solving major social issues.³⁷

Of all the reasons for sharing this fact, the following are particularly significant.

The first relates to the great confusion that characterizes the theory of most of the human sciences. If the latter's specialists agreed on their definition

of "theory", a gradual development of theoretical construction could be envisaged. However, this is not the case. Those who anticipated real progress on this point some 15 years ago - particularly in psychology, economics, sociology and political science - are disappointed today. Nearly all have felt "obliged" to formulate their own "theory" from scratch, as if the contributions of others were insignificant. Furthermore, too much energy is unfortunately spent in academic quarrels, e.g., the conflict between "functionalists" and Neo-Marxists. These quarrels hold no promise of an ultimate theoretical contribution, since the opponents address basically different issues and their reproaches are based primarily on irreconcilable ideological positions.³⁸ We will come back to this question.

Theories in the human sciences are inadequate and, in addition, the objects on which researchers wish to apply their theories are very often uncooperative. Indeed, these "objects" are often "subjects" - groups, organizations or individuals - who, for many reasons, are increasingly opposed to being analyzed unless their own requirements are met.

Rightly or wrongly, groups, organizations, and individuals have the growing impression that researchers take advantage of them and that they seek to "manipulate" or at least "orient" them according to their own ideological convictions instead of basing themselves on the findings of rigorously conducted research. Unless there is a new alliance between researchers and social organizations, the former will have no choice but to carry out their work from the outside or to negotiate the terms of their work with the groups, organizations or individuals they wish to study. This change will require that the professional conscience of researchers be beyond reproach. At the same time, however, it will increase the already numerous constraints upon research in the human sciences.

In 1968, the late Jean Boucher, then director of the Canada Council, displayed keen insight in writing the following:

I would now like to enlarge the scope of the discussion by attracting your attention to the growing resistance met by social researchers from the very groups which up to now had been lending themselves willingly to enquiry and observation, if not to manipulation. It seems likely that from now on the social scientist will have to bargain for his admission to the research grounds with the group he intends to study, with the public authority which controls the situation, or with both. He will have to admit that he is looking for special privileges, since he wants to come on stage after the roles have been assigned and the play is on. These privileges he will have to earn. It is not enough for him to invoke

academic freedom; he will have to demonstrate he is an acceptable partner in an activity that reaches beyond strictly scientific matters. It is unlikely that he will succeed in doing this unless he is willing to assume a new role himself. He can no longer slip away from assuming the responsibility for the modifications his research activity can bring about in the social situation under study. Indeed it is only when he defines himself as another agent in the process of change that he will be able to draw from his own involvement all the scientific benefits that can be derived from it, and that he will find himself in a position approaching that of the experimenter in his laboratory.³⁹

Furthermore - and this is another source of concern about the development of the human sciences - it is very often risky to generalize the findings of a study of specific cases. This is due primarily to theoretical or methodological deficiencies, to the resistance of research subjects and to the precariousness of the findings. Also, research subjects are part of a much larger context which has a certain influence difficult to determine, so that the development itself of disciplines may be affected. This is the case of the national political framework whose specific effect on political science has been demonstrated brilliantly by Alan C. Cairns.⁴⁰

The human sciences have considerable difficulty in developing in relation to their acquired knowledge or past errors. The greatest disappointment of researchers undertaking a project is that they must often start almost from scratch, even for questions previously studied extensively. Those who designed and conducted the research activities of the major inquiry into bilingualism and biculturalism in Canada between 1964 and 1967 deplored the absence of any useful theory to formulate their assumptions and report the whole mass of facts collected. They expressed the hope that those pursuing their work would profit from their tentative efforts. However, if these same individuals had to continue their work today, they would be very disappointed. In spite of the great importance of bilingualism for science and society and of all the efforts of a large number of researchers in the last 10 years, there has been very little progress in comprehensively defining the problem; this is due to the inability of the theorists of the disciplines concerned to consolidate the basic concepts and specify the methodology of applied linguistics. There has been, therefore, very little improvement in the value of their diagnosis and proposals for reform.⁴¹

The recognition of these deficiencies should not lead specialists and decision-makers to conclude that the human sciences have nothing to contribute

to the knowledge of society, to its components, to the questions raised and to the results of the objectives pursued. Even if these contributions do not appear to meet the pressing requirements or the expectations of social agents, they are nevertheless valid and without them society would be in worse shape.

As stated by Easton:

...if medicine had been abandoned in the Middle Ages because its cures were thought to have been worse than the diseases, these diseases today in most instances would probably have grown to be even worse than the cures. In other words, despite all their limitations, the continued improvement of the social sciences requires that they make the best contribution at their disposal... Whether we like it or not, however, the findings and generalizations of the social sciences, however insecure, have now become part of the political debates through which policies are formed.⁴²

We believe that the present trials of human science researchers are not futile. From them they learn humility and perseverance, and they become conscious that they must demonstrate the social merit of their disciplines if they want to be taken seriously. As stated by Gilles Paquet:

I contend that it would be scandalous to continue to pump additional money into social science research in the name of improvement of social policy without ensuring that it will indeed provide some help. To do more of the same may not be rational. The incredible ignorance that we have of the circumstances, of the significance and of the effectiveness of social science research as an instrument of social policy is a shield behind which all possible positions can comfortably hide.⁴³

Over the last few years, human science researchers have been the object of painful criticisms. They can, however, draw something positive from this by determining the real possibilities of their disciplines to advance the knowledge of society.

The social merit of the human sciences remains limited but, conversely, one cannot state that the knowledge of nature and the functioning of societies has not progressed since Aristotle. The human sciences are, after all, somewhat significant for social and economic agents.

These sciences have been successful in discovering, listing and classifying certain facts and data; they correlate these facts quite easily, indicate how each fact varies in relation to the others and to what extent; using the method of regression analysis, each grouping of facts contributes to define a given situation. If such studies were unavailable, bureaucrats and employees would not be able to assemble the necessary data for decision-makers.

By utilizing partial theories and proven methodologies, human science researchers are able, in spite of all the demands addressed to decision-makers, to isolate the main issues and formulate propositions for social policies.

Lacking clear and sure solutions, these researchers are able nonetheless to suggest other ways and to test their potential effects by using the method of computer simulation. On this point, Gilles Paquet writes as follows:

From the observation-only stage and the assemblage of information, to the construction of more and more complex classification schemes, to the development of functional analysis, the social sciences have matured. They have developed from empirical sciences into formal ones, from a body of information into a language of problem solutions... The language-of-problem solution developed by the social scientist is often quite different from the unspecialized language in which citizens and other social actors are couching their problems.⁴⁴

Many university researchers believe that the human sciences must be confined to the study of situations. For example, their interest in social policies is limited to making a post factum analysis. To preserve the purity of research, many of them feel they must stay away from decision-makers. They conduct their case studies from a distance and base themselves on official documents and a few interviews. In our estimation, researchers can and must be much more involved in the actual decision-making process; they need only take the necessary precautions to avoid sacrificing scientific rigor. Thus, in specific social policy cases they would know what to advance. We quote here again Gilles Paquet, who takes the opposite view:

But, on the whole, if asked whether one can ascribe responsibility for great successes and failures in Canadian social policy (understood to be dealing with the integrative system) to social science research, I would have to say that the answer is no... As I try to read the palimpsest of the Canadian social policy, I find very little which can be ascribed to social science research and even less that can be ascribed to the dynamic monitoring of previous policies. This is due to a number of factors: in part to the fact that Canadian social scientists have withdrawn to their ivory tower; in part to the fact that whenever they have jumped in, their expertise has too often proved irrelevant, if not completely bogus; and in part to the fact that, when the few who have the capacity and will to monitor the system and to improve the social technology have become active, this has often not triggered important social improvements because of failures in the action programs, political and social leadership, and in the functioning of institutions.⁴⁵

He arrives at the following conclusions:

The effectiveness of social science research for social policy depends on the channels into which its results are plugged, and it is the responsibility of the social science research system to ensure that its output reaches the decision-

maker, i.e., the person who manipulates the levers. It is not sufficient for the social scientist to translate the problem into a language of problem solution and to solve it: he must also translate his answers into a language of persuasion and ensure that it reaches the decision-makers. If this entails a new division of labor in the social sciences, and if we still have a serious lack of social engineers, this is a flaw in our social science apparatus.⁴⁶

This kind of direct involvement of researchers in the development of social policies must not produce undesirable effects for researchers and decision-makers; thus, Gilles Paquet suggests the creation of a "Council of Social Values": As for the locus for the dialectics administrator-researcher inside and outside the public administration, it would have to be embodied in a system composed of different types of organizations dealing with various types of problems at different levels in specialized settings... On the basis of this new deal between the social scientist and the social administrator and of the coordination of these loci for the policy multilogue around a sort of Council of social values, social scientists are bound to become more effectively present in government operations.

This examination of the effects of research on social policies is but one example of the desirable dialectic relationships between social researchers and the many organizations studied: trade unions, business and employer groups, political parties, citizens groups, human rights commissions, and so on.

Negotiations with administrators concerning the terms of research and the use of its results are not limited solely to research contracts based on "make-or-buy policy" in the public and private sectors. Free research funded by grants from research councils is also included. Indeed, the terms of a great many free research projects require that agreements be negotiated with the bodies in question. Without such agreements, researchers would be forced to study their subjects from outside, since intricate, even mysterious, organizations would not make available the principal information. Free research experts are gradually realizing that they are wrong to ignore bodies whose assistance they need by advancing the often illusory argument of "objectivity". On the contrary, in seeking financial assistance they must also examine with the organization how their research can usefully meet the organization's own objectives.

It is no longer possible, therefore, to continue to rely solely on the conscience of the individuals concerned. The temptation to yield to the lure of individual interests is too great. There could result imprudent compromising between researchers and decision-makers. Researchers must learn to live with these risks; however, they also need to be protected against decision-makers and

against themselves.

We agree with Gilles Paquet's conception and suggest that a group of university researchers, civil servants and representatives of various social milieux (e.g., employer associations and unions) formulate a code of ethics. This code would set the rules and standards for negotiating research contracts between researchers and their sponsors. This would eliminate the risk of research detrimental to scientific standards and ethics and, at the same time, the standard of social merit would be optimally attained.

Research granting bodies and learned societies could cooperate with the representatives of researchers and administrators in the drafting of this code of ethics, which would have several additional functions. University researchers could use it to measure the scientific merit of their work and, if necessary, to guard against loosely conducted research. Several universities set aside a portion of their usual operating funds or special funds to provide teachers with financial incentives for research. The code would give committees responsible for distributing these funds a criterion for assessing projects. It would act as a standard of scientific and social evaluation of research results for all concerned - researchers, administrators and bureaucrats.

It would be unfortunate if researchers disregard this conception of the relationships between research and the bodies within which it is conducted, and if they continue to depreciate any research implying a negotiated agreement between sponsors and themselves.

In Canada, the "make-or-buy policy" of governments is increasingly penetrating industrial laboratories as well as universities. These bodies are investing more and more in university research in comparison with grants of scientific councils. If researchers refuse to give themselves institutional tools to safeguard scientific and ethical standards, the quality of university research and ultimately graduate studies will be affected. The temptation to yield to immediate gain is too great and the inexperience of researchers too extensive to rely on private negotiations between the parties concerned.

More basically - and this is the main theme of the present chapter - the development of the human sciences depends essentially on the dialectic between research theories and subjects and between these theories and research results. It is only by being fully involved as researchers, and not as mere actors, in the

problems and stakes of the overall social situation that they can hope to serve society and further the development of knowledge. Finally, a code of ethics would protect researchers against the decision-makers and against themselves.

3. Opposition to Human Science Research

Not only must science and research provide justifications for themselves and for society, but they must also defend these justifications against those from within or without who oppose them. Science is judged severely by the leaders of official organizations who seek to orient the choice of subjects studied in order to reap the greatest benefits from the findings. It is also taken to task by students, teachers, writers, leaders and members of movements who radically oppose it and who accuse it of being a party to the "turpitudes" of "establishments". In the eyes of the decision-makers, scientists have acquired an "authority" that enables them to act as they please and even to influence the decision centres; those who oppose them, however, consider they have prostituted their knowledge and are only straw men serving society's ruling groups. This latter kind of contemporary opposition to science is basically different from before, since it usually comes from those cast aside by the ruling powers rather than from the powerful themselves.

As seen in the Introduction, science is not a natural activity but an historical reality. Except in rare instances, it has had to defend its rights against powerful detractors who condemn it on the basis of some religious, philosophical or political orthodoxy. We may be entering a new era where science will again be accused of being opposed to values and social order.

This change of attitude is profound and widespread and has occurred over the last 10 or 15 years at most. In the United States, where the indications of this new wave of opposition to science and research first appeared, studies conducted in the '50s, involving students, politicians and the general public, had not identified any sign of discontent. Quite the contrary, scientists were seen as intelligent and liberal persons and their work as most useful to their country and to humanity.⁴⁷ It is only during the '60s that science and research began to be challenged. Disenchantment became generalized with the greater threat of war and with wars themselves, and with the increased deterioration of the environment blamed on technologies resulting from science.⁴⁸ Many people, using

various forms of "evidence", accuse science of having gone awry.

Edward B. Harvey considers that the reasons for this new suspicion of the '60s and early '70s originated outside Canada and resulted in the same effects in our country, though with a time lag.⁴⁹

The first criticisms were aimed at the "repercussions" of industrial and military technologies attributed to the natural sciences, and then, very quickly, social technologies and the whole of the human sciences were the target of criticisms.

The humanities do not escape this opposition. So writes Mark J. Curran: The humanities professor is no less responsible for the consequences of his work than is the scientist. Yet how many scholars and teachers of literature have even begun to consider such questions as the relationship between the alienation that occurs in the classroom and the alienation that exists in our country; how the content of literature courses reinforces an exploitative and competitive society and increases apathetic or nihilistic despair; to what extent class bias affects the study and teaching of literature; in what ways the concept of "objective literary inquiry" affects the consciousness of student and teacher in the classroom and in society?... Instead of leading the student to see the object as it really is and thus to criticize our current way of life, the experience of literature is used to reinforce a sense of helpless awe before the complexity of our culture, which is not to be tampered with by amateurs.⁵⁰

According to the opponents, there are many factors explaining the so-called corrosive action of science: illusion of "power" blinding the scientists, lack of insight, false belief in the "neutrality" of science and proletarianization of researchers.⁵¹ One reason is very often mentioned: the take-over of the university and research by private and public funders. Some, like Don K. Price, feel that the system of government grants to universities and researchers has not affected the independence of the latter. For others, especially Marxists and proponents of critical science, the chronic financial dependency of the universities and research - which has greatly increased since World War II - indicates that they have become the instrument of the "establishments".⁵²

The reports of our task forces and disciplinary studies deal very little with opposition to science, research and graduate studies in Canada. Though this survey is mentioned on a number of occasions by students who participated in our student survey, the observations bear only on very global aspects.

Using direct statements and secondary sources of information, we will outline the major features of the current opposition. We will follow an already adopted plan: first, the internal forms of this opposition and then its external signs

in relation to the scientific, technological and social merit of science.⁵³

a. Internal Opposition to Science

Science is being questioned at its very foundations as the main product of the "Church of reason", denounced by Robert M. Pirsig in one of the best-sellers of the last few years.⁵⁴ Reasoning, pure logic, experimentation and generalization are seen as intellectual operations which are strictly Western in origin; capitalism and the bourgeoisie have hypertrophied some of the features of the human mind to the detriment of other qualities such as the certainty of instinct and the creative spontaneity of intuition. Science as it has developed since the 17th century is not the superior form of knowledge; it has fallen behind religion and the arts, where the latter manifestations of the human mind have escaped the corrupting effects of the scientific mentality, e.g., the academic books on aesthetics. These books dissect the concepts and definitions of a notion like "quality" which can only be grasped when experienced by all the senses.

In his excellent work, J.W. Grove brings out the particular aspects of this new "anti-science" current. The source of this current is not found, as in the past, outside but within science:

The role of a kind of resistance movement against secular and religious politics is not new to science. What is new about the contemporary current of anti-science ...is to be found, paradoxically, in the present state of science itself. Science has emerged in the 20th century as a seemingly irresistible force, supremely confident of its powers and of the virtue of its characteristic modes of thought. It has advanced at a staggering rate and has been immensely successful in increasing our knowledge of the physical universe, of the origin and nature of life on earth, and even of man himself... But there is another side to the coin. It is now clear that the exponential growth of science can continue only on certain conditions that are rather unlikely to be realized; that the information 'explosion' which the growth of science has triggered has become virtually unmanageable; that scientific rationalism, for all its past triumphs, is even yet unable to persuade us conclusively that it constitutes the best hope for civilized men; and that the remarkable progress in understanding the universe we inhabit has, indeed, been bought at a price.⁵⁵

In addition, the integrity of modern scientific practice itself is questioned. The complex conceptual machinery developed by scientific disciplines, especially in the human sciences but also in the natural sciences, could conceal ideologies that scientists unknowingly contribute to spreading, solely because they are dependent upon the decision-makers.

As stated in the Introduction, science is not an activity transcendent to the particular cultures of civilizations, nations and social classes; it is rather the result of a symbiosis of the values it transmits and the values of the communities with which it comes into contact. It plays a part in each civilization, each nation and each social class, and this part varies according to the characteristics of civilizations, nations or classes. Reciprocally, each of the latter modifies the attributes of science. Who wins and who loses in these exchanges? In one of its reports, Unesco raises the question in the following terms:

Within industrial countries, do the social classes that consume the products of science adopt the scientific mentality, or is the latter merely juxtaposed with the basic national culture that remains heterogeneous? If there is penetration, what costly deterioration or beneficial osmosis occurs? Do the protests of the young generations of industrial countries indicate a desire for more widespread science or for a different form of scientific development? Do they indicate a depreciation of scientific values, or are they merely a demand for some neglected human value?⁵⁶

Science is perceived as so permeated with ideology that it becomes itself an ideology - this is what the Marxists say about functionalism in the human sciences. Its basic concepts and methodology are seen as moulded by society, which controls the theoretical foundations of scientific disciplines. Thus, researchers are confined to examining and reexamining society under its various facets without ever being able to question its ultimate purpose or to conceive a different form of social development. This functional knowledge of society is even more mystifying in that it justifies, in the name of science, a social order that perpetuates the supremacy of business capitalists. At the Saint-Paul-de-Vence Conference, the advocates of "socialist" science harshly criticized the practitioners of "bourgeois" science and accused them of seeking to avoid discussion by hiding behind the protective screen of scientific "neutrality".

b. External Opposition to Science

The application of science, especially technology, is also criticized. There are many who feel that the criticisms of science often bear, in fact, on the harmful effects of industrial and social technologies: destruction of natural environments, pollution, depletion of nonrenewable natural resources, urban congestion, regional disparities, social inequalities, industrial diseases, and

so on.

These critics are rightly accused of confusing two different realities: science whose purpose is to discover new knowledge, and technology which is the use of science to produce practical results. But as the differences between pure and applied science or pure and applied research become blurred, it is acknowledged that the distinction between science and technology is, in practice, difficult to establish.⁵⁷

The proponents of "critical" science demand that scientists cease to close their eyes as frequently to the social and moral consequences of the direct results of their work, especially in the case of experiments in genetics, nuclear physics or human behavior. If technologies are not neutral but have an unquestionably moral nature, the same is true - though on a different ground - of the science that produces them.

The proponents of critical science raise another accusation: considering that modern society can be challenged in its very foundations and in most of its outputs, science must be blamed for accepting this social context. Thus, science implicitly condones an order that maintains and justifies profound social inequalities; it ignores the needs of the underprivileged and protects the superior position of the dominant classes. One has only to consider the subjects of most research financially supported and valued by societies to realize the validity of this criticism.

Any further discussion of these well-known attacks against science and research becomes really unnecessary.

But there is another question: what would be the effects of a massive adhesion of researchers to the positions of so-called critical science - usually of Marxist orientation - in the context of a capitalist and liberal society?

These researchers should logically refuse any research grant or contract from public and private bodies whose basic orientations they criticize. Conversely, should representatives of these bodies continue to fund research that would have negative and even destructive effects on the existing social structure, which they are often the first to defend? Even though the two parties may consider their respective ideological positions radically opposed, should they not recognize the integrity of science and agree on specific research subjects and on the general implications of the results?⁵⁸

In industrially developed societies, science and public and private bodies must arrive at a working agreement that allows progress to be achieved without violating the scientific rules and professional ethics of researchers. Most often, these are now tactical agreements since both parties need each other. There is rarely between them a discussion of their respective objectives. They are generally silent on this point, out of a sense of discretion, implicit mutual trust, unconcern or masked complicity. The "intrusion" of critical science complicates relationships but does not change the basic rules of the game. On this point, J.W. Grove raises very relevant questions:

My question, therefore, is whether, or for how long, science can survive in a technological society in which the stated aim is to tie science even more firmly to the search for technological solutions and to "national goals"; in which a vast amount of science is done in support of missions or as "free" research in mission-oriented agencies; in which, in a word, science policy seeks to bind fundamental science to the immediately perceived needs of the state; and where this policy draws its support (even in part) from currents of opinions that attack science and tend to pervert and destroy the scientific attitude through misunderstanding of its nature.⁵⁹

The dilemma raised above between a disinterested and poor science and a mission-oriented and rich science is very considerable. When researchers are asked to be socially "relevant" and to conduct socially useful work, it would be acting in a totalitarian way to divert them by more or less subtle means from the fundamental question: "what kind of society?"

We are aware that this question does not provide a solution to the problem of the social integration of science and research. It is obvious that research and society would face insurmountable problems if all researchers were of Marxist obedience in a capitalist and liberal society. Yet, if there were no researchers acting as radical critics, a number of major questions needing to be raised in a society like ours would be ignored or dealt with superficially. The spirit of reform, indeed of revolution, which every free society must always encourage, would risk disappearing.

We cannot reasonably expect in a society like ours that the leaders of public and private bodies will provide generous grants to research that is radically critical. They are interested primarily in research that is likely to help society function just about the way it does now. They may agree to research that proposes adjustments within the limits of the foreseeable capabilities of absorption of the existing system, but no more. No one can blame their

attitude since that is precisely the reason why they occupy these positions.

To compensate, bodies providing aid to free research should allocate a portion of their funds to research that is radically critical.

4. The Logic of Science and of Society

Jean-Jacques Salomon writes that "one could imagine a society abounding with material goods and allocating an increasing portion of its wealth to the development of knowledge merely for the sake of knowledge."⁶⁰ But no society has yet reached this stage. Some continue to yield to a totalitarian approach and seek to harness science. All of them have an instrumentalist conception of scientific research. As President Kennedy said in a speech to members of the National Academy of Sciences: "scientists only can establish the objectives of their research, but society in extending support to science must take account of its own needs."⁶¹

Similarly, one could imagine a science so in control of its entire environment that it could give unqualified assistance to those requesting it without fear of being diverted from its natural vocation.

There exists, in actual fact, a mutual distrust between researchers and most decision-makers at any level. This distrust results from the mutual unawareness of the objectives they respectively pursue each time they negotiate an agreement. Human science research often bears on social policies, controversial issues or vulnerable groups such as the mentally ill, the socially deprived or "problem" communities.⁶² The distrust is even greater in that researchers seek privileged access to sources of information, and their research findings may change the situation within which decision-makers operate. Jean Boucher states the following:

The best laid scientific plans are put in risk of being compromised at any moment if the group under study can rightly or wrongly interpret it as a violation of their privacy, an occasion for letting outsiders pry out more information on their group than they are left with themselves or as a danger of an irresponsible alteration of existing conditions. Social scientists would be quite wrong to fight this change of climate, which is in reality a sign of maturity in their public and a real opportunity for them to surpass themselves.⁶³

Since they pursue different objectives, science and society can only conclude a precarious and even questionable alliance. This is not new, even if there have been some changes since World War II. J.W. Grove states the following:

There have always been scientists who worked for the state - for example, Archimedes or, 18 centuries later, Leonardo, both of whom (as Russell said) "were granted permission to add to human knowledge on condition that they subtracted from human life". Modern war and modern technology have not changed the principle, but they have added a new dimension: in a world where governments claim their services more and more, where they claim a large share of available public funds to support their work - in a word, where science has been "nationalized" - it has become increasingly difficult for scientists to stay unpoliticized, to resist the pressures of ideology and the demands of national security and well being.⁶⁴

Science is the fruit of a dual dialectic between itself and its research subjects and results; thus, it would remain sterile if society did not provide access to the universe of subjects or the production of results. Researchers would certainly run very great risks if they relied entirely on decision-makers for their choice of research subjects and presentation of findings. However, as with every social activity, research must submit to external check-tests that assess its value and vary according to historical circumstances. It must constantly justify itself to society without selling its soul.

Ideologies are like religions, and they should not be given to dogmatism. It is necessary, however, to identify the "scientific" currents that become dogmatic ideology, since there are some. Indeed, what constitutes dogmatic ideology for some is science for others, and vice versa.⁶⁵

Notes

1. Jean-Jacques Salomon, in Science et société: Le colloque de Saint-Paul-de-Vence (Paris: 1973), p. 33. Who controls pure research, who makes use of it and for what purpose? These questions gave rise to much controversy in the United States in the late '60s. There were three major events: the Hindsight Report, the Traces 'counter' Report, and the National Aeronautics and Space Administration (NASA) crisis. The main purpose of the Hindsight Report is to justify the complete control of research by the State. As for the Traces Report, on the grounds that a "slow" pace is necessary for science to progress, the author attempts to show that the monopoly of the state on scientific activity leads to a situation where longer-term research is dangerously sterile. For its part, the NASA crisis brought to light the fundamental incompatibility between administrative controls on research and the outlook and way of working of scientists. See the Office of the Director of Defence Research and Engineering, Project Hindsight Final Report (Washington, D.C.: 1969); the Illinois Technology Research Institute, Technology in Retrospect and Critical Events in Sciences, National Science Foundation (1968), 2 vols. For an analysis, see David Rousset, La société éclatée (Paris: Grasset, 1973), pp. 664-698.
2. OECD, The Research System, vol. 3, Canada-United States. General Conclusions (Paris: 1974), p. 31. The romance that blossomed between science and politics during the war is over, but this is not to say that today they are divorced from each other. Actually, the one is beginning to call the other to account, and vice-versa. After all, science still experiences the same needs as governments, and governments as science. Thus, in May, 1976, the American Congress passed a law on the science and technology policy of the United States that emphasizes the direct influence of science and technology on society, the interdependence of scientific, economic, social, political, and cultural factors, the need to incorporate scientific and technological knowledge into the decision-making process, the role of science in bettering the quality of life, and the necessity for the United States to put their scientific and technological resources to maximum use.
3. Alvin M. Weinberg, in E. Shils, ed., Criteria for Scientific Development. Public Policy and National Goals (Cambridge: MIT Press, 1967), pp. 21-33, 80-91, 117-118 and Reflections on Big Science (Cambridge: MIT Press, 1967).
4. René Dubos, Reason Awake. Science for Man (New York: Columbia University Press, 1970), p. 114. See also Trent Schroyer, The Critique of Domination. The Origins and Development of Critical Theory (New York: George Braziller, 1973).
5. It is implied here, and it seems presumptuous, that 3% is little for an activity as important as scientific research. Three percent would, after all, amount to many millions of dollars. According to a report from the Minister of State for Science and Technology, the percentage of gross spending on research and development in relation to the Gross National Product (GNP) is far below 3%; it has even decreased since 1969, from 1.29% in 1969 to 1.14% in 1972. See the Ministry of State for Science and Technology, The Make or Buy Policy 1973-75 (Ottawa: 1976). In its report, the Senate

Special Committee on Science Policy recommends that this proportion be increased to at least 2.5%, in order for Canada to remain in a competitive position internationally. In the United States, in 1967, the proportion of the Gross National Product going toward research and development was slightly over 3%. This proportion has been decreasing steadily since that time, and by 1972 it was only 2.6%. See OECD, The Research System. Canada-United States (Paris: 1974), p. 9. There is the same downward trend in Canada. Consequently, this argument has not been brought out as much lately.

6. Don K. Price, The Scientific Estate (Cambridge, Mass.: Harvard University Press, 1969).
7. J.W. Grove, "Science Policy and the Attacks on Science", in B. Chapman, A. Potter, ed., Political Questions. Essays in Honour of W.J.N. Mackenzie (Manchester: Manchester University Press, 1974), p. 137.
8. Jean-Jacques Salomon, op. cit., pp. 88-89.
9. See Steven Rosen, Testing the Theory of the Military-Industrial Complex, (Lexington Books, 1973 .
10. David Joravsky, "Soviet Scientists and the Great Break", in Bernard Barber, Walter Hirsch, op. cit., pp. 111-128.
11. Leopold Labedz, "How Free is Soviet Science? Technology under Totalitarianism", *ibid.*, pp. 129-141. This analysis, which deals with the sciences as such, makes no mention of the cruel fate that a good many genuine scientists have had to suffer. Aleksandr Solzhenitsyn in his book The First Circle extolled these martyrs in the cause of truth.
12. Mobility must also be taken into account. If scientists encounter too many obstacles in one country, they can emigrate to one that is more hospitable. In this way, German scientists, philosophers, sociologists, economists, and men of letters sought refuge in Great Britain, Canada, and especially in the United States during the Hitler regime: by emigrating they were able to continue the advancement of knowledge. Many of the physicists who developed the atomic bomb were German emigrants. Again today physical and social scientists must have the right to emigrate, and host countries must afford them the means to continue their work. Moreover, these scientists go through psychological trauma because of the tragedies in their private lives: this stress can be detrimental to their work and can even cut short their lives. Finally, we must examine the longer-term consequences that can occur in the host countries, for example suspicions about the loyalty of scientists, as was the case in the United States during the McCarthy period.
13. We dealt with this point of view in the introduction.
14. E.C. Ladd, S.M. Lipset, "Should any Research be Off-Limits?", The Chronicle of Higher Education (March 15, 1976). According to this survey, professors who do research are the first to oppose any form of restrictions. Professors who do only teaching have divided opinions on the matter. The report of the Science Council of Canada, Population, Technology and Resources is based on premises derived from projections that are held up as scientific;

this report presents conclusions and recommendations that raise serious moral issues. Scientists are increasingly aware of the moral implications of research; some say that they are ready to accept restrictions, such as a code of ethics that would include restrictive clauses. For the first time, scientists have decided to take steps themselves to control research that could potentially be dangerous for the world or for humanity; some, on their own initiative, are postponing experiments until they are convinced that the risks have been eliminated. See, for example, Martine Allain-Regnault, "Les manipulations génétiques en liberté surveillée", Sciences et Avenir, no. 339 (1975), pp. 476-482 and Paul Berg, "Genetic Engineering: Challenge and Responsibility", American Society for Microbiology, vol. 42, no. 5, (1976), pp. 273-277.

15. See Wallace S. Sayre, "Scientists and American Science Policy", in Bernard Barber, Walter Hirsch, op.cit., pp. 596-609.
16. Edward A. Shils, The Torment of Secrecy. The Background and Consequences of American Scientific Policy. (The Free Press of Glencoe, 1956), pp. 176-191. More than any other factor, the wave of McCarthyism in the United States brought the scientists of that country to understand that, in an age of Machtpolitik (power politics) such as the age we live in today, even in a "free" country like the United States, researchers were no longer safe from totalitarian groups, both right-wing and left-wing.
17. This is the main role of science councils. Because these councils subsidize "free" research, researchers are spared the temptation of compromising themselves intellectually, at least insofar as the financing of the research is concerned. It is a known fact that these councils, despite all the reforms imaginable, subsidize only part of university research. Furthermore, researchers who receive grants from science councils are themselves open to the scientific fashions of the day and to the influence of current ideologies: these penetrate even the fundamental concepts of their analyses, often without the researchers realizing it.
18. Jean-Jacques Salomon, op. cit., pp. 15-16.
19. Madame Jeanne Sauvé, Minister of State for Science and Technology, 1973.
20. J.W. Grove, "Science Policy and the Attacks on Science", op. cit., p. 133. Also, Trent Schroyer, op. cit.
21. See Charles W. Kidd, "American Universities and Federal Research", in Bernard Barber, Walter Hirsch, eds., The Sociology of Science, op. cit., pp. 394-416.
22. OECD, The Research System. Canada-United States (Paris: 1974), p. 121.
23. See OECD, Science, Growth and Society. A New Perspective (Paris: 1971), pp. 15-16, 43-48,

24. In the present discussion we are excluding the possibility of choosing an immoral research project. Whether such a choice is made by the researcher himself or by someone else, it is reprehensible.
25. These data were supplied by the Canada Council. Out of a total of 1,725 questionnaires sent out concerning the three-year survey, 1,464 were completed and returned - that is, a return of 84%. There are approximately two publications for each grant in all fields; the number varies from 1.15 in Canadian literature to 3.53 in psychology. Out of a total of 666 publications, 250 were articles and 85 were books. Fifty percent, then, (335 out of 666) were formal publications; this figure represents an average of a little over one publication for each former fellowship holder.
26. In their account of the major contributions in the social sciences, Karl W. Deutsch et al. do not mention any research conducted in Canada, nor any Canadian researchers. (See "Conditions Favoring Major Advances in Social Science", op. cit.). The situation may have changed since 1965.
27. W.D. Garney et al., "A Comparison of Scientific Communication Behavior of Social and Physical Scientists", Symposium on Communication Among Scientists and Technologists (Lexington, Mass.: Heath Levingston Books, 1970).
28. Arthur J.R. Smith, "The Social Sciences and the Economics of Research", Transactions of the Royal Society of Canada, vol. VI, series IV, (1968), p. 25.
29. Walter Hettich, "Problems of Measuring Research Output", in Special Research Projects: Essays, Investigations and Studies, prepared for the Commission to Study the Rationalization of University Research, AUCC, (Ottawa: 1972), Special Research Projects, 2 vols.
30. David Easton, "The Social Sciences and Public Policy: The Royal Commission on Bilingualism and Biculturalism as a Reference Point", National Social Science Conference (Ottawa: 1975), p. 7.
31. See the "Colloque de Saint-Paul-de-Vence", Science et société, (Paris: 1973), p. 45. In order to avoid the problems caused by a large number of industrial technologies, and unforeseen consequences of a disastrous nature, simulation or other techniques should be developed. Such techniques would enable researchers to predict all the consequences, both beneficial and harmful, of social technologies. Furthermore, one frequent error is to ascribe directly to the technologies the characteristics of the particular uses men make of these technologies. Thus, results are considered to be universal and inevitable when they are merely fortuitous.
32. See Fred Schindeler, C. Michael Lanphier, "Social Science Research and Participatory Democracy in Canada", Canadian Public Administration Review, vol. 12, pp. 481-497; Arthur J.R. Smith, "The Social Sciences and the Economics of Research", Transactions of the Royal Society of Canada, series IV, (June 1968), pp. 21-23; A Science Policy for Canada, Report

- of the Senate Special Committee on Science Policy, Vol. 1, (1970), pp. 117-122; 206-207; vol. II, (1972), pp. 376-377; Jean Boucher, "The Social Sciences: In Preparation for Take-off", Transactions of the Royal Society of Canada *ibid.*, pp. 4-10; Jean-Jacques Salomon, Science et politique, *op. cit.*, pp. 363-364; Don K. Price, The Scientific Estate (Cambridge, Mass.: Harvard University Press, 1965), pp. 257-278; T.N. Guinsburg, G.L. Reuber, Perspectives on the Social Sciences in Canada (Toronto: University of Toronto Press, 1974); Social Science Research Council of Canada, Social Science in Canada, vol. 2, no. 3 (Ottawa: 1973).
33. Robert M. Pirsig, Zen and the Art of Motorcycle Maintenance. An Inquiry into Values, (New York: Bantam Books, 1974), p. 165.
 34. In adopting this distinction, the Senate Special Committee on Science Policy contributed a great deal to keeping alive a needlessly heated debate in the universities, especially in the human sciences.
 35. The following discussion could apply equally well to determining the "social value" of curricula and to research. Universities are expending a lot of energy to adapt curricula to a broad range of social needs that they want to satisfy. In our opinion, the "social value" of a curriculum should be judged according to how "pertinent" it is, both with regard to the different disciplines and to concrete social problems. A narrow definition of the "pertinence" of curricula could have a catastrophic effect on the training of students in the different disciplines and on the study of social needs. Concerning these needs, we must examine the ways that curricula can best be adapted to meet them. And what responsibility does the university have towards each of its many "clients"? Is the university to shoulder this responsibility alone, or should it not find a way of sharing the load with its "clients"? The principle of sharing responsibility is gaining acceptance. According to this principle, universities are freed from part of their responsibility to provide technical and professional training, a task for which they are now ill-equipped. In any case, companies generally prefer to give special training themselves to the university graduates they hire. However, a complete sharing of responsibility would require the teaching and administrative staff of the university to work in closer association with their "clients".
 36. See OECD, Reviews of National Science Policy. Canada, Publication No. 26.223 (Paris: 1969). For an article defending scientific research and satirizing the positions held by the "Scientific Community", see Ronald J. Silvers, "In Defense of Socially Irrelevant, Scientifically Significant Research", Canadian Review of Sociology and Anthropology, vol. 6, no. 1, (1969), pp. 58-61. Such stands are taken in reaction to statements by decision-makers who would like research to serve utilitarian purposes.
 37. David Easton, "The Social Sciences and Public Policy", *op. cit.*, pp. 2, 7, 15 and 22. Many social scientists have expressed similar points of view. See the excellent article by Marc J. Roberts, "On the Nature and Condition of Social Science", Daedalus, 103, (Summer, 1974), pp. 47-74.

38. See Theodore J. Lowi, "The Politization of Political Science", American Politics Quarterly, vol. 1, no. 1, (1973), pp. 43-71.
39. Jean Boucher, "The Social Sciences: In Preparation for Take-off", Transactions of the Royal Society of Canada, vol. VI, series IV, (1968), p. 7.
40. See Alan C. Cairns, "National Influences on the Study of Politics", Queen's Quarterly, vol. 81, no. 3, (1974), pp. 333-347, and "Alternative Styles in the Study of Canadian Politics", Canadian Journal of Political Science, vol. VII, no. 1, (1974), pp. 101-134.
41. Two recent studies prepared for the Federal Treasury Board, the Coulombe and Bibeau Reports, corroborate our view. These brilliant studies contain a wealth of carefully collected data, and present very valuable analyses and many conclusions and recommendations that our politicians will have to consider. On the other hand, the authors have not accomplished much more than the reports of the Royal Commission on Bilingualism and Biculturalism, from which they borrowed a lot of ideas on theory and methods.
42. David Easton, op. cit., pp. 8, 16 and 24. On this point Easton's view is similar to ours: the advancement of knowledge hinges on a double dialectic, on the one hand between the theories, and the objects of study, and on the other hand, between the theories, and the results of research. How these two dialectics in the humanities and the social sciences interact is still not clear, and the onus is on researchers to solve the question.
43. Gilles Paquet, "Social Science Research as an Evaluative Instrument for Social Policy", Department of Economics, Carleton University, Carleton economic papers (71-04), (Ottawa: 1971), pp. 51-66; and in G.E. Nettler and K.J. Krotki, eds., Social Science and Social Policy (Edmonton: Human Resources Research Council of Alberta, 1971), pp. 51-66.
44. Idem.
45. Gilles Paquet, op. cit., p. 59. The author precedes his text with a quotation from W.H. Auden: "Lecturing on navigation while the ship is going down". Indeed, social science researchers excel at examining "crisis" cases; they show remarkably clear insight into the malaises troubling society, which they study almost clinically, but they have few "solutions" or "remedies" to offer.
46. An unusual relationship developed between the researchers and the commissioners (in this case, the decision-makers) of the Royal Commission on Bilingualism and Biculturalism. This is a good example of the role that Gilles Paquet believes should be assumed by researchers in the humanities and social sciences in developing social policies. See David Easton, op. cit.

47. See, for example, Margaret Mead, Rhoda Metraux, "The Image of the Scientist among High-School Students", Science, vol. 126, no. 3270, (1957), pp. 384-390; Bernard Barber, Walter Hirsch, op. cit. pp. 230-246; David C. Beardslee, Donald D. O'Dowd, "The College-Student Image of the Scientist", Science, vol. 133, (1961), pp. 997-1001; *ibid.*, pp. 247-258; Harry S. Hall, "Scientists and Politicians", Bulletin of Atomic Scientists, 1956, *ibid.*, pp. 269-287. These studies reveal that even today, when there is "peace among scientists", people, especially politicians, are reacting with "fear" and "suspicion" to the destructive capacity of some scientific technologies and to the internationalism of science.
48. See OECD, Science, Growth and Society. A New Perspective (Paris: 1971).
49. Edward B. Harvey, "Canadian Higher Education and the Seventies", Interchange, vol. 5, no. 2, (1974); also, Fred Schindeler, Michael Lanphier, "Social Science Research and Participatory Democracy in Canada", Canadian Public Administration Review, vol. 12, pp. 481-497.
50. Mark J. Curran quoted in Fredson Bowers, On a Future for Graduate Studies, American Association of University Professors (1970), p. 368. As can be seen from the sometimes acrimonious discussions between the participants at the conference at Saint-Paul-de-Vence on science and society, the matter at issue is science as a whole, in itself, and in all its forms, and not simply the natural sciences, or the human sciences. The most heated debates are centred on the human sciences.
51. The delegates gathered at Saint-Paul-de-Vence mentioned that scientists have less prestige now, owing to the professionalization of science, and that they have even been reduced to a proletarian status, which has left them feeling alienated in a peculiar way. As a result, some, considered to be left-wing, have revolted in an effort to make the scientific community aware of "their role as intellectual workers in relation to the community as a whole". See the conference at Saint-Paul-de-Vence, op. cit., pp. 49, 67-68.
52. Don K. Price, The Scientific Estate (Cambridge, Mass.: Harvard University Press, 1971), p. 71. The discussions under way between researchers and civil servants or other employees can be considered as the price, more or less, of being financed. (See our previous remarks.)
53. Today's questioning of science takes different forms, of which the view known as "critical theory" is doubtless the most important. The spokesmen for this school of thought generally have Marxist leanings, and are commonly known as "neo-Marxists" or "post-Marxists". The studies done on the concepts of "critical theory" are too numerous to mention here. For a synthesis, see Trent Schroyer, The Critique of Domination. The Origins and Development of Critical Theory (New York: George Braziller, 1973).

54. Robert M. Pirsig, Zen and the Art of Motorcycle Maintenance. An inquiry into Values, op. cit. The "revolt" against "rational" reason is not new; examples of it can be found in the works of philosophers from other generations, such as Henri Bergson, and in the works of novelists such as Léon Bloy. What is original about today's movement is its scope, and especially, the interest in the "mystical religions" of the East that often accompanies the phenomenon of social class.
55. J.W. Grove, op. cit., p. 127.
56. Unesco, La science et la diversité des cultures (Paris: Presses universitaires de France 1974), pp. 30-31. (French version only).
57. See OECD, Science, Growth and Society. A New Perspective (Paris: 1971), pp. 16-22.
58. In some of its forms, notably neo-Marxism, there is no reason to believe that left-wing researchers would not respect the rules of science or professional ethics. On the contrary, they criticize "bourgeois" science researchers for violating both these rules and professional ethics.
59. J.W. Grove, op. cit., p. 140. Grove is referring to a type of attack on science that is very different from the previous one. "Ivory tower" scientists are being criticized here.
60. Jean-Jacques Salomon, Science et politique, op. cit., p. 129.
61. John F. Kennedy, quoted in René Dubos, Reason Awake. Science for Man (New York: Columbia University Press, 1970), p. 107.
62. One example that comes to mind is the Camelot "research" project set up by the United States government in 1966 to study the major causes of political unrest in countries going through periods of "crisis", including Quebec. At least one Canadian researcher took part in the study on Quebec.
63. Jean Boucher, op. cit., p. 8.
64. J.W. Grove, op. cit., p. 128.
65. These remarks apply not only to research but also to graduate studies themselves. A sometimes bitter debate has been going on for a few years in a number of universities, concerning the "scientific" and ideological trend of curricula in the human sciences. Discussions between, for example, the "neo-Marxists" and the "Functionalists", would be less acrid if both sides were less dogmatic, and if they recognized that for science and society, there is plenty of room for complementary roles.

CONCLUSION: FUTURE PROSPECTS

Each university is shaped extensively by its history and its environment. There is no ideal type of university that is universally acceptable. There are, however, limits as to how universities can differ from each other. With regard to graduate studies and research, excellence cannot be defined nor can it be achieved in a thousand ways. The range of possibilities is limited.

The examination of graduate studies and university research in the human sciences has led us to identify a certain number of quality indicators: overall student population and proportion of students pursuing graduate studies; number of master's and doctoral programs; number of degrees awarded annually and proportion of PhDs and master's in relation to undergraduate degrees; teacher/student ratio; qualifications, age and rank of teachers; funds invested in research; number of research projects and scientific publications; infrastructure, especially graduate teaching, research and library facilities; and liaison with scientific communication systems. Many of these indicators are quantitative; however, due to the absence of strictly qualitative indicators acceptable to all, we thought these would enable a sufficiently accurate assessment of the relative quality of an institution.

One of the first facts to emerge is that universities have invested, both in relative and absolute terms, very unequal resources in the development of their graduate studies and research; consequently, output has ranged very widely. Overall, however, the institutions that initially headed the list seem to have improved their position over the years in relation to the others.

Universities that distinguished themselves in one sector tended to excel in most of the others; conversely, universities that did poorly in one field were unsatisfactory in all of the others. It seemed justifiable to classify universities with graduate programs in terms of a three-degree scale: superior, average, inferior. This quality scale corresponds in fact with the situation of Canadian universities.

Nowhere is there a clear distinction between the human, the natural and the health sciences. The assessment we wanted to make was complicated by two factors: the available data could not be easily separated from the whole, and educational criteria for these categories of disciplines were nonexistent. The

theories and methodologies of the human sciences are not clearly distinct from those of the natural sciences, and this same imprecision also exists with respect to the integration of the human sciences in university teaching and research structures. Only recently has there been some thought of redefining the institutional frameworks and teaching methods, originally developed for the natural sciences, in relation to the specific requirements of the human sciences.

Discussions continue about graduate studies and university research as though they were an undifferentiated whole. Yet, as the human sciences increasingly develop in the universities, they must be considered separately from the natural sciences and according to their own characteristics; this will lead to the establishment of new institutional frameworks and teaching methods.

Another point emerges from our analyses: the universities that have experienced the greatest effects from the establishment and development of graduate studies and research in the human sciences have all made substantial changes in the allocation of their human and material resources. At the same time, they have had considerable internal tensions which have resulted in questioning the former balances of the research structure and its programs. However, we have lifted only part of the veil. More extensive studies are required to fully clear up this issue, which will be of capital importance for the university organization.

As a result of the pressures of graduate studies and research in the human sciences, the 15 or 20 universities that have achieved a first level of development will be subject to strong tensions in the next few years. This raises the following question: how can an institution like the university initiate the dynamic process of change to solve these tensions and thus improve its performance? It would be extremely myopic to predict future conditions on the basis of the current situation.

First, there is the question of funding. The universities have long deplored the inadequacy of operating funds and grants received from the three major federal research councils and from provincial bodies. The universities are now in a very poor financial situation because the rate of increase in operating funds and research grants has been lower than the rate of inflation these last few years. University administrators and researchers seize every opportunity to deplore openly this situation, which they consider a serious obstacle to the

growth of graduate studies and research. We do not challenge the validity of their claims. However, it is not enough to establish the fact of this relative reduction of grants. It is also necessary to specify to what extent this reduction hinders the development of graduate studies and research, whose output would be increased if more funds were available. To hide the following would be to ignore the facts: many bureaucrats and leaders of large social organizations, such as employer and business groups and unions, consider that universities do not make the best use of their funds and that, with better management, they could produce more with less money. We will come back to this point.

There is also the matter of the number of PhDs awarded annually. In our opinion, many individuals from the government and public sectors make very Malthusian estimates of the number of PhDs required in the next few years.

If current employment sources were used as the basis of future requirements, it would certainly be necessary to restrict the output of PhDs, since it appears that these sources will not increase their requirements by very much in the years ahead. Circumstances may change, however, and there may be a greater need than expected for teachers and researchers, and thus for new sources of employment.

The same is true of the demand for university teachers. Based on the current situation, the need for new teachers seems very limited in the next few years but, in about 15 to 20 years, the universities will face an even greater demand for university faculty than in the '60s, as a result of the aging of the existing teaching body and a new influx of students. So as not to be caught unprepared when this occurs, precautions must be taken now, for example by constituting a reserve teaching body.

However, there is more. It is possible and even probable that tomorrow's teachers will differ greatly from today's both in terms of the nature of their work and the way in which they carry it out. The following questions come to mind: What will be the impact of the unionization of teachers on the establishment of work standards? What will be the effects of the increase in university research (emergence of non-teaching researchers; more frequent sabbaticals to keep abreast of scientific discoveries and to increase the rate of publications; more numerous and more frequent absences from the university as a result of the greater demands of scientific communication systems; more small group research seminars; greater internal and external pressures with respect to productivity,

thesis supervision, publications, para-university activities)? Will the teacher/student ratio be modified as a result of the overspecialization of disciplines, the growth of multidisciplinary education and the implementation of new individual teaching methods? For the benefit of graduate studies and improved graduate instruction, we propose the creation of a category of professional full-time teaching and research assistants who may need to have a PhD.

These and many other similar changes will certainly create a greater demand for teachers and PhDs as early as the late 1980s.

There is a need for more competent graduates who are better able to adapt to change. Similarly, the university must allow teachers to make their specialized knowledge available to those outside the university who will increasingly require this knowledge. A new kind of teacher will emerge: increasingly capable of moving from one task to another, he will plan his career better and adjust his work (teaching, research, administration, para-university involvement) according to his probability curve of productivity; he will conduct more research which will better meet the needs of social groups; he will be more rigorously scientific and more enlightened about outside pressures. At the same time, more will be expected of the teacher from both within and outside the university.

Canadian universities should have a certain number of teachers devoted exclusively to the development of knowledge, therefore to research, and for whom teaching would in effect be research. If this occurs, scientific research will remain in the university, and society will fully benefit from the contribution of the university of tomorrow.

The nature and needs of this university must be considered according to other criteria than those used to assess today's university. On this point, the same questions recur: What are the factors that explain the evolution of Canadian graduate studies in the last 15 years? Considering the situation of each university and looking into the future, what strategies would lead to change and to the further development of graduate studies and university research?

The successes or failures of a university are often attributed to individual or institutional factors, for example the greater or lesser sagacity of a university president and of his immediate colleagues. We do not underestimate the advantages of good management or the disadvantages of poor management. Thus, an institution whose administration has made the right decisions at the right

time will have benefited from initiatives whose effects have repercussions in the departments and teaching body as a whole. On the other hand, judgmental errors at critical times will have had a paralyzing effect on even the most minor aspects of university life.

Some wrongfully consider that the interests of the senior university administration and the objectives of teachers and students are incompatible. In actual fact, the close network of interaction that links these three components of the university's human fabric is extremely complex. One could perhaps note that, in many respects, the administrators are the natural allies of students when the latter challenge teachers, for example in the matter of defining more demanding teaching standards or of conceiving the greater participation of students in the various administrative bodies and teaching units.

It would be completely erroneous to see the presidents of existing universities as isolated in a distant Olympus and dictating orders. Today as in the past, good presidents are by temperament or necessity highly distinguished and keen-minded academics - they are conceivers more than administrators. They are able to get others to share their lofty perception of the university and, due to their success, to associate the university's overall constituents to projects created from the collective thought. Good presidents are catalysts more than entrepreneurs. A university does not remain indifferent, of course, to a series of good or poor leaders; however, the significance of this factor is too often blown out of proportion, especially when taken separately. On the contrary, the margin of freedom of the university administration is very limited and is subject to strict structural controls.

Throughout this report, we have discussed the many structural constraints, both external and internal, that restrict the freedom of universities. The right of governments to inspect the management of universities is now such that the latter are, in fact, public institutions. Thus, flights of oratory on the autonomy of the university would fail to recognize or would reject this new situation. This refusal of the facts can have unfortunate effects.

The fact that the universities had more autonomy in the past in relation to governments was due to a combination of circumstances in days gone by. Today, the operating funds of universities are very considerable, and 75 to 85 per cent of these funds come from public coffers; it is only justifiable that governments,

accountable to citizens for the use of these funds, have the right to inspect the financial and even educational management of universities. Action programs like Ontario's Advisory Committee on Academic Planning (ACAP) and Quebec's major "operations" are only one of the many forms of government intervention in the life of the universities. They must be considered as very modest interventions in comparison to the new methods of control that could soon be initiated.

The universities must willingly accept that henceforth their needs will not automatically be met. Like every other social organization, they will have to apply the necessary pressures and protect and promote their interests to governments and the public. They will have to prove that these interests should take priority over a host of equally legitimate interests which various groups seek to promote. To be considered, their demands will have to be formulated according to the requirements of governments toward every organization.

Since the governing authorities must take into account the electors, they will be naturally inclined to give a lower priority to graduate studies and research. To avoid being cast aside, the universities will need to have recourse to public information media to convince the public that the progress of studies and research are essential for maintaining a high standard of living and protecting the quality of life in society.

Even in most of the Canadian universities where they are solidly established, graduate studies and research encounter many internal obstacles. As a result of the internal pressures of students and the basic teaching units, the undergraduate level continues to absorb most of the available resources.

Through their associations and their unions, teachers are seeking to ensure maximum professional security at a time when it appears threatened; they tend to fall back upon the departments which constitute impregnable positions where they can exercise control over the university as a whole. It is to be expected that the negotiations between teachers and university administrators over salaries, working conditions and the conception of the university itself will become tougher over the next few years. The strike that jolted Laval University during more than three months at the start of the 1976-77 academic year could well be a precursory sign of these more difficult times.¹

The consolidation of the administrative and educational role of the departments is one of the most visible consequences of the action of teachers. Though

beneficial for the undergraduate level, this expanded role could seriously handicap graduate studies, which require less teaching and administration and more multidisciplinary team research.

We have examined the reasons - these and others like the inadequacies of the infrastructure, especially libraries - for the relative underdevelopment of graduate studies and university research. Undergraduate studies are now overloaded with programs that could be provided just as well and at lesser cost in general or community colleges. Since they are growing in numbers and their needs increasing, master's and doctoral students should bring pressure to bear on the proper university authorities, starting with the departments, to offset the pressure applied by undergraduate students. By doing this, they would greatly facilitate the task of teachers mainly interested in graduate studies and research.

These changes alone would be insufficient, however, to make research in the human sciences an integral part of student programs and assignments as well as to enable the teacher to benefit from a new status as researcher.

The establishment of committees does not guarantee the development of graduate studies. The bureaucratic changes, which have paralyzed for too long the best efforts of the undergraduate level, must not occur at the graduate level. Still, the graduate study structures are deficient. To enhance them, it will be necessary to turn to the faculty of graduate studies, the departmental administrations of graduate studies and the research centres. The creation of numerous standing or special committees will not correct the deficiencies of these basic structures, far from it.

To turn things around, the method of allocating operating funds to universities should be revised. As long as these funds are based entirely on the number of students enrolled at the various levels and on other indicators related mainly to inputs, the logical reaction of universities will be to inflate the student population with no regard to output and even less to quality. In the present context, quality can only be pursued to the detriment of the student population. Few Canadian universities would agree to reform for the sake of improvement if this meant a reduction in their operating funds.

Funding bodies at present base themselves on inputs to determine the amount of operating funds for universities. To incite universities to concentrate more

on quality, they should also use criteria based on outputs: number of students enrolled in programs defined as major orientations; number of bachelor's and master's degrees and PhDs awarded; number of officially recognized research projects; number of student and teacher publications; development of the infrastructure (library, etc.); improvement of the educational services; participation of teachers in national and international scientific communication systems and so on. Finally, to further ensure the quality of doctoral studies, we would propose the establishment of provincial admissions committees; and independent committees should examine the thesis plans of candidates before renewing fellowships.

There are growing questions concerning the poor productivity of public and para-public bodies such as hospitals and teaching institutions. In these institutions, the preferences voiced by consumers (patients, students) have little effect on the goods and services made available to them by the producers. Research on this issue within the university identifies the reasons for the difficulty in measuring productivity. This productivity is considered on the whole inadequate. However, the research advances few concrete proposals for improvement² and tends too much to leave this question in the hands of the agents of the system. Yet students are not properly informed, they act too sporadically and their field of action is too limited. Teachers draw too many individual and collective benefits from the status quo. And administrators are unable to effect the changes they want. Therefore, only an external agent - the government - could in consultation and in agreement with the universities and its related bodies, such as provincial university councils, initiate a dynamic process of change through the simple revision of the criteria used for granting operating funds. This dynamic process would lead universities to pursue the objective of quantitative and qualitative output, and thus to truly follow the pathway to excellence.

Notes

1. An extensive study of this phenomenon should be undertaken. For general comments, see B.L. Adell, D.D. Carter, Collective Bargaining for University Faculty in Canada (Ottawa: AUCC, 1972); André Desgagné, Roger Miller, L'université et la syndicalisation des professeurs (Editeur officiel du Québec: 1975).
2. See, for example, Jack Linquist, "Political Linkage. The Academic Innovation Process", Journal of Higher Education, vol. 45. no. 5., (1974), pp. 323-343; and Gérard Bélanger, Le financement de l'enseignement supérieur au Québec (Council of Quebec Universities, 1975).



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